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International
Marketing Information
Series

Global Market Survey

GMS

Communications Equipment and Systems

PENNSYLVANIA STATE UNIVERSITY
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DOCUMENTS COLLECTION

U.S. DEPARTMENT OF COMMERCE
Domestic and International Business Administration
Bureau of International Commerce

International Marketing Information Series

This report is one of a series of Bureau of International Commerce publications focusing on foreign market opportunities for U.S. suppliers. The series is made available by the Bureau's Office of International Marketing in cooperation with the U.S. Foreign Service-Department of State. Most reports are based on research conducted by overseas contractors under U.S. Foreign Service supervision or by economic and commercial officers of the Foreign Service or Department of Commerce.

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As part of its marketing information program, OIM makes available to the U.S. business community, on a continuing basis, eight types of publications and reports.

1. *Global Market Surveys:* In-depth reports covering 20–30 of the best foreign markets for a single U.S. industry or a group of related industries.
2. *Country Market Sectoral Surveys:* In-depth reports covering the most promising U.S. export opportunities in a single foreign country. About 15 leading industrial sectors are usually included.
3. *Producer Goods Research:* In-depth reports covering the best foreign sales opportunities for a single U.S. producer goods industry, or group of industries.
4. *Consumer Goods Research:* In-depth reports covering the best foreign sales opportunities for a single U.S. consumer goods industry, or group of industries.
5. *International Marketing Newsmemo:* Information bulletins received directly from the U.S. Foreign Service; reports prepared by U.S. businessmen or Department of Commerce officers; and usually distributed unedited. They cover a wide variety of industries, products, and countries.
6. *Overseas Business Reports:* Reports that include current and detailed marketing information on all of our leading trading partners. Most are revised annually.
7. *Foreign Economic Trend Reports:* Annual or semiannual reports prepared by the U.S. Foreign Service that cover, individually, almost every country in the world.
8. *International Marketing Events:* Brief market summaries in support of trade promotion events organized by the Office of International Marketing. Also, detailed calendars of upcoming events.

To supplement and up-date the marketing information available in this series, and for specific ordering information, we suggest that you telephone the nearest Department of Commerce District Office or the Country Marketing Manager responsible for the area or areas in which you are interested. A directory of these key people and offices is printed on the back cover.

Global Market Survey

Communications Equipment and Systems

U.S. DEPARTMENT OF COMMERCE
Domestic and International Business Administration
Bureau of International Commerce
Office of International Marketing

September 1977

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Table of Contents

The Global Marketing Program iv

Major Foreign Markets for Communications Equipment and Systems—an Executive Summary 1

Country Market Surveys:
- Australia 5
- Brazil 12
- Colombia 19
- France 26
- Germany 33
- Italy 40
- Japan 49
- Malaysia 56
- Mexico 61
- Republic of China (Taiwan) 68
- Saudi Arabia 75
- Singapore 80
- South Africa 86
- Spain 93
- Thailand 99
- United Kingdom 106

U.S. Government Services for American Exporters 115
- Marketing Assistance and Information Services 115
- Financing Export Sales 118
- Export Credit Insurance 118

List of Commerce District Offices .... Inside back cover

List of Country Marketing Managers .... Inside back cover

The Global Marketing Program

The Global Marketing Program is aimed at assisting U.S. industry to develop and expand its exports on a worldwide basis. It involves medium and long term actions by the Government in concert with selected U.S. industrial sectors designated as "target industries".

The Program, developed and implemented by the Bureau of International Commerce, provides a wide range of U.S. Government services designed to introduce and promote the sales of American products in the foreign market place. Although primary efforts are focused on approximately 15 American industries, the Program and its related services are available to most U.S. firms.

Target industry selections are based on an assessment of each industry's competitive advantages and growth potential in the world marketplace. The Office of International Marketing (OIM) solicits information and assistance from firms and trade associations in each U.S. target industry, in planning the trade promotion programs, in developing market research requirements, in selecting the country markets to be researched, and in determining the viability of Commerce-sponsored trade promotional events abroad.

A Global Marketing Program, combining the services outlined herein, is prepared for each target industry.

Global Market Survey

Original foreign market research, conducted in 15 to 25 countries under the supervision of OIM and the U.S. Foreign Service—Department of State, is made available to U.S. firms in each target industry. Additionally, a *Global Market Survey* is made available to U.S. firms upon request. This publication summarizes the comprehensive research to provide a comparative analysis of the country markets surveyed for the U.S. businessman. It is used by many companies in their overseas market planning. It is especially useful to "new to export" and "new to market companies." It contains supplementary information particularly beneficial to the uninitiated in utilizing Government information, financing and other services available to U.S. private enterprise.

Marketing Information and Counseling

Country Marketing Managers assist American companies in increasing their export business in specific countries and regions of the world by providing current marketing information and by working with individual companies in promoting their products.

Commerce District Office account executives provide Global Market Surveys to firms in the "target industry" and work with them in the preparation and implementation of individual company export marketing plans.

Trade Promotion Events

U.S. firms are invited to participate in a series of Commerce-sponsored overseas commercial exhibitions, trade missions, seminars, and catalog shows scheduled for each industry. The U.S. Department of Commerce has been organizing these types of foreign trade promotion events for various sectors of U.S. industry for many years. The objective is to help U.S. manufacturers develop and increase their export sales and introduce U.S. firms to new foreign markets.

A schedule of other trade events held throughout the world but sponsored by foreign organizations also is available.

To obtain a copy of these schedules contact your nearest Department of Commerce District Office listed on the back cover.

Following is a description of the types of trade promotion events organized by the U.S. Department

TARGET INDUSTRIES

Air and Water Purification and Pollution
  Control Equipment (1976)
Laboratory Instruments (1976)
Business Equipment and Systems (1976)
Electrical Energy Systems (1977)
Building Products and Construction Equipment (1977)
Medical Equipment (1977)
Communications Equipment and Systems (1977)
Computers and Peripheral Equipment (1977)
Graphic Industries Equipment (1977)
Electronic Components (1977)
Production Equipment, Test Instrumentation and
  Special Materials for Electronic Components (1977)
Process Control Instrumentation (1978)
Food Processing and Packaging Equipment (1978)
Metalworking and Finishing Equipment (1978)

(Actual and expected publication times of Global Market Surveys noted in parenthesis) of Commerce and the services available to U.S. participants:

Commercial Exhibitions at U.S. Trade Centers.—The first U.S. Trade Center was opened in London, England in 1961. There are now 14 U.S. Trade Centers around the world in which over 80 exhibitions of U.S. industrial equipment and products are conducted each year. Each exhibitor is furnished with a fully constructed exhibition stand, furniture, utilities and janitorial services. A catalog of exhibitors and an exhibition brochure is prepared and delivered to sales prospects throughout the marketing area. An all-media exhibition promotion campaign is conducted by U.S. Department of Commerce trade promotion specialists. They make personal calls on key sales prospects, to ensure that all decision-makers for equipment (or product) purchases are invited to the U.S. exhibition. Shipping and marking instruction are provided to exhibitors so that exhibit items can quickly clear customs enroute to the exhibition.

U.S. Pavilions at Major International Trade Fairs and "Solo" Trade Fairs.—These exhibitions are organized and promoted in a manner similar to commercial exhibitions at U.S. Trade Centers, and U.S. exhibitors receive the same service from the U.S. Department of Commerce. Usually, U.S. pavilions are set up within major trade fairs in important foreign markets. On occasion, the U.S. Department of Commerce will independently organize a "solo" trade fair in a country where there is no U.S. Trade Center or major international trade fair but where prospects for U.S. exports are good.

Symposia and Seminars on Technological Developments.—These events are organized to introduce and explain new technology or new products to the market. The audience is comprised of engineers, scientists, technicians, managers, and directors from organizations which ultimately would purchase U.S. products incorporating the new technology. These events often are held in conjunction with commercial exhibitions or at meetings of professional organizations. Industry contributions are variable.

Trade Missions.—Organized either by the U.S. Department of Commerce or by an industry group or trade association, trade missions are supported by the Commercial Attaches at U.S. Foreign Service posts overseas. Appointments are made for mission members with important sales prospects and government decision-makers. Trade missions usually travel to several countries in a region with high sales potential for particular U.S. exports.

Catalog Shows.—These shows are organized by U.S. Department of Commerce and U.S. Foreign Service trade promotion specialists. Inquiries from prospective buyers and/or distributors are sent directly to each U.S. company promoting their products through these events.

Privately-Sponsored Events.—Single U.S. companies may hold product or service promotions in U.S. Trade Centers. These activities are sponsored, organized, and conducted by the companies themselves or their representatives in the country.

Jeep.—Joint Export Establishment Programs (JEEP) are tailor-made promotions designed to help small groups of U.S. manufacturers of related products to inexpensively penetrate new markets on a shared-cost basis.

Please contact the nearest U.S. Department of Commerce District Office or the appropriate Country Marketing Manager listed on the back cover for more information on these events.

Other Marketing Assistance

The Office of International Marketing is responsible for developing an effective foreign trade promotion program related to U.S. industry's needs in most U.S. trade areas. Other action units within the Domestic and International Business Administration (DIBA) include: the Bureau of East-West Trade and the Commerce Action Group for the Near East, concentrating special expertise and business services on the trading opportunities in their respective geographic areas; the Office of Export Development, providing vital data on export opportunities and on potential overseas customers; and the Office of Field Operations, delivering all of these services to the doorstep of the American businessman through 43 District Offices.

To make effective use of these and other services contact your nearest Commerce district office.

Major Foreign Markets for Communications Equipment and Systems —an Executive Summary

The modernization and expansion of national communications networks is being undertaken in virtually every country of the world as a prerequisite to continued economic development. Large-scale government projects are expected to double world demand for advanced and conventional telephone, telegraph, data communications systems and components, subassemblies and associated test equipment over the next 10 years. While about half of this market is presently in North America, experts predict that Europe, Japan, and the developing countries will take close to 60% of total communications equipment sales by 1985.

U.S. manufacturers are expected to satisfy a sizable portion of this demand, particularly in the areas of advanced and specialized products.

Market research conducted for the U.S. Department of Commerce in 16 selected countries[1] indicates that their aggregate expenditures for equipment exceeded $9.5 billion in 1975 and could reach more than $16.7 billion by 1980. This growth will come both from countries with established communications networks, which are undertaking extensive modernization programs, and from newly-wealthy nations such as the Near East oil producers, which often buy highly sophisticated, complete systems. Public spending makes up the bulk of the international communications equipment market. This is almost entirely handled by a country's PTT (post, telephone and telegraph authority) as a major component of the national development plan. Although some multinational communications projects have been organized, particularly in the use of regional satellite transmission systems, planning and purchasing are still almost always done on an individual country basis.

Probably no country in the world is satisfied with its present communications system. In this decade, while the number of telephones worldwide has increased at around 7% annually, the number of telephone calls has mushroomed at an annual rate of over 20%; an increasing number of these are international calls. Besides sheer volume of demand, new service and technologies are placing a burden on PTTs. Telex has widely overtaken the use of telegrams as a medium of business communication. Data communications is growing rapidly, spurred by the increasing worldwide use of computers. Of the surveyed countries, none have networks dedicated exclusively to data transmission; Germany, France, Japan and some others, however, have plans to establish such systems. The growing use of both satellite and transoceanic cable are creating new markets for associated equipments. Countries with outmoded telephone systems have a continuing need for electronic switching and other advanced telephone apparatus.

Marketing Opportunities for U.S. Firms

Imports of communications equipment into the 16 countries totalled $1.2 billion in 1975. The overall percentage of imported equipment in the markets listed is expected to remain at around 12% through 1980, when it could reach as much as $1.7 billion.

U.S. sales to the selected countries totaled nearly $322 million in 1974. The largest markets for American products, both in volume and in market share, are the developed countries. They require the largest amounts of advanced equipment. Some nations, such as the Republic of China and Thailand, are traditional users of American telecommunications products. The surveys report that U.S. equipment is not well enough known in several markets, such as Germany, Malaysia, and Singapore, and that greater marketing effort could bring increased sales.

U.S. origin communications equipment is universally respected for its quality and advanced technology; buyers report that it is generally priced competitively with similar equipment. American companies make the majority of their sales with products of advanced technology and new equipment design. The most saleable U.S. products include: Data transmission equipment, microwave systems and components, satellite ground equipment, electronic exchanges, teleprinters, CCTV, mobile radio equipment and communications test equipment. Some countries (including Brazil, France, Japan, Mexico, Spain, and the Republic of China), have strong "buy national" policies restricting government purchases to local manufacturers whenever possible; in these markets U.S. suppliers find their most active sales with the private sector.

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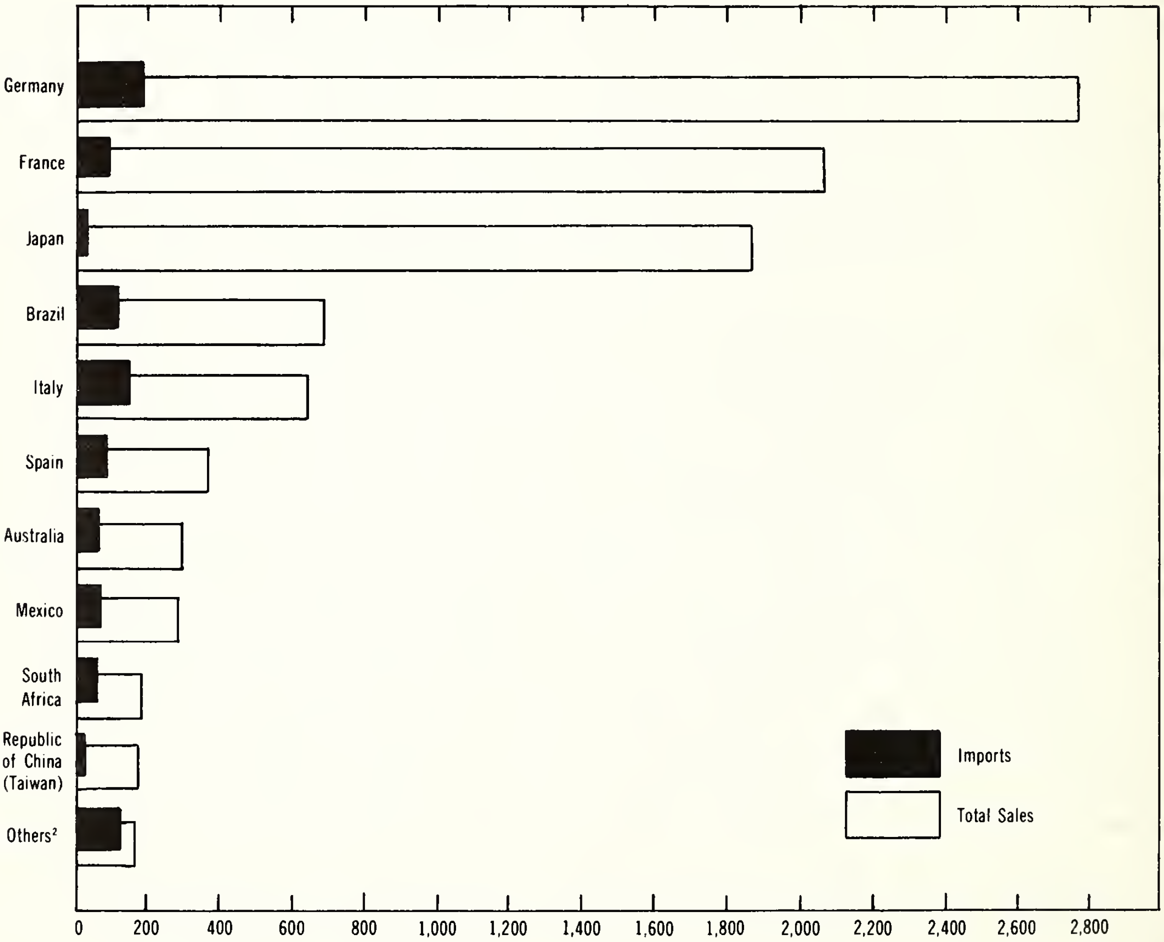
[1] Countries listed in the table on page 2. Equipment expenditures by the United Kingdom were unavailable; the U.K. is included in all other aggregate figures.

Most developed countries produce standard telephone and other communications equipment locally. Of the 16 researched countries only Colombia, Malaysia, Singapore, and Saudi Arabia do little manufacturing of this equipment. In the developing countries, much of this manufacture is actually equipment-assembly using imported parts. International production of communication equipment is dominated by multinational corporations, so that suppliers from the United States often find their keenest competition comes from overseas subsidiaries of other U.S. firms. Many companies listed in the reports as French, British and particularly Belgian are in fact subsidiaries.

The strongest competition to American manu-

Communications Equipment and Systems: Market Size and Imports of Surveyed Countries[1], 1975

(Millions of U.S. dollars)



[1] United Kingdom, Saudi Arabia not available

[2] Singapore, Thailand, Columbia, Malaysia

Source: Bureau of International Commerce, Office of International Marketing research studies.

facturers of standard telephone equipment comes from Germany, Sweden, and, more recently, Japan. Other countries whose equipment manufacturers are active in this market include the United Kingdom, the Netherlands, and Italy.

Price is an extremely important consideration to most buyers. Even countries such as oil-wealthy Saudi Arabia have become more price-conscious in their purchasing. The industrialized European countries, just recovering from the 1974 recession, are also highly attentive to price. Financial terms and credit are also important considerations to most buyers, who often favor a supplier offering long term credit.

Equipment Markets

Highlights of specific equipment markets covered by the Country Market research are given below:

Transmission Equipment.—Purchases of modern transmission systems comprise a large share of every communications equipment market. Systems used depend on the terrain of the country. Earth satellite stations (in practically all research countries), microwave systems (South Africa, Thailand, Saudi Arabia), submarine cables (Malaysia, Singapore), coaxial cables (Taiwan, the United Kingdom) and pulse code modulation are the most important of the advanced methods. Wire, cable, and other standard equipment is manufactured in almost every country. Only the more expensive products must be imported.

American manufacturers have so far found their best markets in the developed countries but as use of sophisticated technology spreads, sales are also coming increasingly from the developing nations as well. In the fields of satellite and microwave transmission U.S. suppliers hold a near-dominant position.

Telephone Exchanges.—Central and private exchanges are actively being replaced with electronic models particularly in countries undertaking overall modernization and expansion of their telephone networks, such as Malaysia, Brazil and the United Kingdom. Sales by U.S. companies are limited generally to parts and subassemblies (sold to local manufacturers) and advanced electronic machines.

Subscriber/User-premises Equipment.—Equipment such as telex, teleprinters, telefacsimile equipment, and intercoms is gaining rapidly in world markets as business practices become increasingly sophisticated. Telephone devices for recording, monitoring, and visual contact are also becoming popular. In some countries these accessories are purchased only by the government, but in most, private purchasers represent a sizable portion of the market. Approval of the PTT is almost always necessary. Teleprinters and telephone accessories have provided the strongest U.S. sales in this equipment category. Countries regularly purchasing American equipment include France, Spain, Colombia, and the Republic of China.

Microwave Components.—Components are purchased by manufacturers in Europe and Japan. Strong competition gives an advantage only to the most advanced products. The best markets for U.S.-made components have been the European countries, Japan, Brazil, Australia and Thailand.

Nonbroadcast Radio and TV Equipment.—Military, police, and fire services, and transportation companies (including taxi in some countries) all use communications radio systems. Countries with fishing industries, such as Spain, Brazil, Italy, and Mexico also purchase marine radio systems. These systems are either handled exclusively by the PTT or must

Communications equipment: U.S. sales by country, 1974

	value ($000)	*percent of total imports*	*products representing largest share*
Australia ..	13,400	25%	nonbroadcast radio and TV (20%) test equipment (37%)
Brazil	15,854	20%	test equipment (27%) nonbroadcast radio (52%)
Colombia ..	7,750	28%	telephone, telegraph equip. (55%) mobile radio (21%)
France	117,935	36%	microwave components (81%)
Germany ..	33,300	17%	test equipment (31%) microwave components (31%) data transmission (15%)
Italy	24,550	17%	transmission (45%) nonbroadcast radio and TV (29%)
Japan	22,990	70%	test equipment (43%) microwave components (12%) data transmission (10%)
Malaysia ..	1,546	4%	telephone, telegraph equipment (83%)
Mexico	6,330	9%	test equipment (36%) telephone exchanges (18%) subscriber/user-premises equip. (17%)
Republic of China .. (Taiwan)	6,801	40%	mobile radio, land (35%) mobile radio, marine (29%) transmission (12%)
Saudi Arabia	3,700	7%	telephone, telegraph equipment[1] test equipment
Singapore ..	5,400	17%	telephone exchanges[1] transmission
South Africa	3,420	7%	nonbroadcast radio and TV (48%) telephone, telegraph equip. (24%)
Spain	14,950	21%	telephone, telegraph equip. (40%) nonbroadcast radio and TV (28%) data communications (25%)
Thailand ..	4,117	36%	mobile radio and TV (39%) transmission (18%)
United Kingdom ..	43,294	24%	test equipment (57%) telephone, telegraph equip. (29%)

[1] Percentages not available.

Source: Bureau of International Commerce, Office of International Marketing research studies.

operate with PTT permission. Two areas of special growth are: CCTV, just entering many markets and used by banks, airlines, hospitals, schools, and large stores; and paging systems, becoming popular in Europe. Both of these are generally sold as complete systems.

U.S. non-broadcast radio sales have been primarily accounted for by mobile land radio systems, but marine radio sales are becoming increasingly significant. American firms also have a strong position in the international market for CCTV and paging systems. Spain, the United Kingdom, Australia, Japan, Colombia, South Africa and Singapore are among the best markets for American products.

Data Communications Systems.—The remarkable worldwide increase in computer use has brought forth a strong demand for data communications systems. As lines previously restricted to PTT data transmission only are opened to private customers, large institutions—particularly banks—are entering the market. High-capacity modems, multiplexers (especially time-division) and message-switching equipment are finding increasing markets abroad. Since the major portion of the world's computers are of American make, U.S. manufacturers have a favored position in this market.

American dominance of this equipment market extends to practically every country surveyed, most notably Germany, Spain, Australia, Colombia, the Republic of China, and Japan. Modems, multiplexers, and switching equipment comprise the bulk of U.S. sales.

Communications Test Equipment.—Advanced test equipment is just entering many markets, particularly in the emergent market countries, but the need for it is strong and will remain so as PTTs modernize their networks. Countries like Mexico import virtually all telecommunications test equipment. Producers such as Germany and Japan import the more advanced products. The United States is the recognized leader in this category, and holds a major share of the market in all countries researched.

Further Sources of Information

U.S. exporters of communications equipment have many marketing aids available to them from the U.S. Government. The U.S. Department of Commerce regularly issues reports prepared by the Foreign Service and its own researchers describing overseas market conditions, specific sales opportunities, long-range development programs, and tariff and non-tariff barriers to trade. These reports can be obtained through the nearest Commerce District Office, listed on the inside back cover of this Global Market Survey. Information on overseas communications equipment markets is also collected by: The Office of International Communications Policy (EB/TCA/TD), U.S. Department of State, Washington, D.C. 20520, and the Office of International Trade (EB/ITP/OT), at the same address.

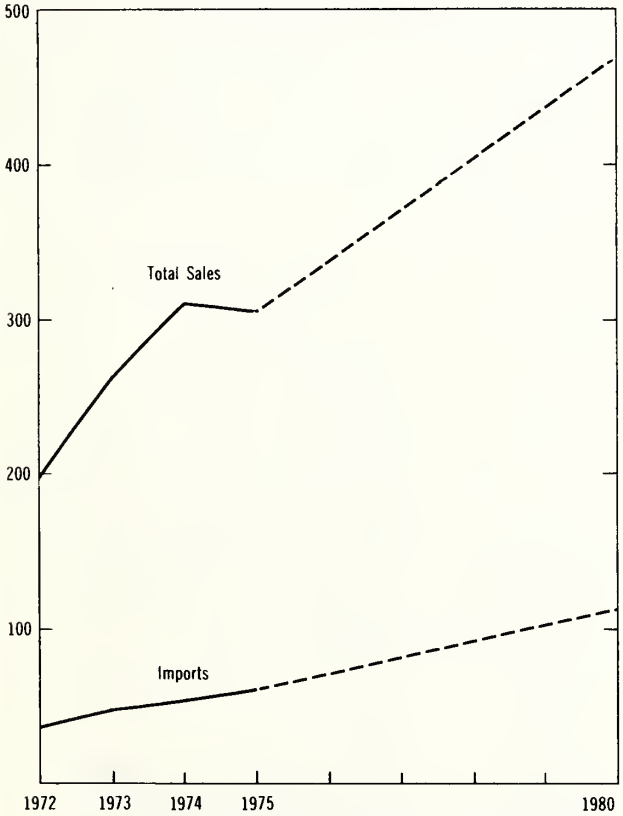
The most important organizations supporting international trade are described at the end of the Survey. An excellent guide to international financial resources is the Department's "Official U.S. and International Financial Institutions," which can be ordered from: the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, for a charge of 35 cents. Request Number 003-009-00226-5. Specific questions concerning international financing should be directed to: the International Finance Division, OIFI/DIBA, Room 4424, U.S. Department of Commerce, Washington, D.C. 20230.

To obtain the technical standards applied in a given foreign market, an inquiry stating the product and country involved should be sent to: the National Technical Information Service, Technical Help to Exporters, Springfield, Virginia 22161. If the information is not on file, the agency will give an estimate of the cost and time needed to get it.

Participation in international trade shows and U.S. Trade Center exhibitions is an effective way of becoming known to foreign buyers. The ITU Technical Assistance Program, placing technical advisers in developing countries, has also introduced U.S. communications technology to overseas markets. NATO makes sizable purchases of communications equipment; bidders must be certified by the Department of Commerce. Visits by foreign PTT officials to U.S. plants arranged through the Departments of Commerce and State also increase familiarity with American products. Information concerning these programs can be obtained from: the Bureau of Domestic Commerce, Room 2800, U.S. Department of Commerce, Washington, D.C. 20230, or the local Commerce District Office.

Australia

Sizable government purchases pushed the Australian market for communications equipment forward at an average annual rate of 25% between 1972 and 1974, reaching $311 million[1] in the latter year. (See table 1.) Purchases fell slightly in 1975, but continuing automation of the national telecommunications network and rising government data transmission requirements are factors that indicate a projected annual market growth of 9% for the remainder of this decade. Total 1980 sales are expected to approach $470 million. (See figure.)



Australia: Communications equipment market 1972-75, projected 1980

(in millions of U.S. dollars)

Source: Bureau of International Commerce, Office of International Marketing research study; values based on official Australian statistics and trade estimates.

U.S. Sales Outlook

As demand for advanced communications equipment grows, and local production costs rise, Australian imports of communications equipment are expected to nearly double from their 1975 level of $61.5 million to over $110 million in 1980. (See table 2.) This represents a rise in the importance of imports to the total market from 20% to 24%.

U.S. manufacturers provided $13.4 million or 25% of Australia's imports in 1974. The United States is the country's leading supplier of data communications equipment, nonbroadcast radio and TV communications equipment, microwave components, and communications test equipment. American-made equipment has a reputation for high reliability and technical performance and excellent quality. Trade sources suggest that many U.S. firms could increase their sales with stronger local representation, a greater willingness to comply with government contract specifications, and closer competitive pricing.

A leading U.S. supplier to the Australian communications equipment market is International Telephone and Telegraph, which supplies mobile radio and data transmission equipment not manufactured by its Australian subsidiary, Standard Telephones and Cables. Motorola Inc. is also an important American supplier of mobile radio equipment. General Telephone and Electronics Corp., Rockwell International, Hewlett-Packard Co., Tektronix Inc., Sperry Rand Corp., International Commuication

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[1] All values are shown in U.S. dollars. Local currency data are converted at the following exchange rates: US$1=A$.84 (1972), A$.71 (1973), A$.67 (1974), A$.76 (1975 and subsequent years).

All figures are based on the Australian fiscal year, which runs from July to June.

Australia—Selected Indicators

Population (1975):	13.5 million
Gross National Product (1975):	$76.5 billion
Number of installed telephones (1973):	4,659,000
Number of computers (1974):	2,420
Number of telex services in operation (1975):	14,766

Corporation, Timeplex, Voca Communications, and Andrew Corporation are also active in the Australian market.

Specific equipment markets offering good sales potential to U.S. manufacturers are:

Data communications equipment.—The Australian market for data communications equipment is forecast to triple between 1974 and 1980, reaching $24.5 million. Imports were valued at $3.1 million in 1974, accounting for 38% of the total market, and are expected to reach $11.5 million (or 47% of the market) in 1980. The Austrailan Telecommunications Commission accounts for about 90% of purchases. U.S. producers supplied 39% of Australia's import requirements in 1974 (See table 3) and their percent should rise as local computer usage continues to grow. The best-selling American products in this area are modems and multiplexers. The ATC's planned introduction of a time-division multiplexing system by 1980 will involve a $10 million contract for which U.S. companies can bid.

Nonbroadcast radio and TV communications equipment.—Sales of nonbroadcast radio and TV communications equipment stood at $37.5 million in 1974 and are projected to increase to $57.5 million in 1980. Excellent promotional activities, backed by a superior product line, have contributed to the success of U.S. sellers, who supplied 38% of the $7.2 million import market for this equipment in 1974.

Land and marine mobile radios are the major component of this equipment category. Mobile radios are widely used by such government agencies as police and fire departments and by the transport and other service industries. Buyers like small, efficient units. Both commercial and recreational boating provide a rising market for marine equipment, all of which must be Single Side Band. Paging equipment represents a small but growing market, mostly to hospitals. The Australian CCTV market is new and quite fragmented; price is a determining factor in end-user purchase decisions. Standards for this equipment are set by the Postmaster General; greater conformance could significantly increase sales by U.S. suppliers.

Microwave compenents. — Imports comprised 81% of the $3.7 million market for microwave components in 1974. U.S. producers, with 1974 sales of $1.6 million, held a 53% share of this import market. Although the Australian market for microwave components is small, it should see steady growth as the ATC expands its network; total sales are expected to grow to a level of $5.5 million in 1980. U.S.-made components already have a reputation for high technical performance and durability among end users.

Transmission equipment.—Sales of transmission equipment were valued at $85.3 million in 1974 and are forecast to reach $116.5 million in 1980. U.S. sales, which accounted for 10.5% of the 1974 import market, could greatly increase through the decade. Although most of this equipment is produced locally by U.S. and European manufacturing affiliates, trade sources indicate good sales possibilities for U.S. suppliers of microwave equipment, particularly message baseband radio, waveguides and dehydrators. A market may also develop soon for digital transmission equipment and millimeter waveguide equipment, which heretofore has been used only for research and test purposes, and for satellite equipment.

Subscriber/user premises equipment.—The size of the market for subscriber/user premises equipment was $39.9 million in 1975. U.S. sales represented about 14% of the $14.7-million import market that year. Highest demand is for intercom equipment, telephone-answering devices, and recording devices. American manufacturers make most of their sales in the most advanced items. All of this equipment is purchased by the ATC or with its approval.

Abbreviations

APO	Australian Post Office
ATC	Australian Telecommunications Commission
CCIR	Consultative Committee on International Radio
CCITT	Consultative Committee on International Telephone and Telegraph
COMPAC	Communications Pacific
CUDN	Common User Data Network
INTELSAT	International Telecommunications Satellite Organization
ITU	International Telecommunications Union
OTC	Overseas Telecommunications Commission
PMG	Postmaster-General's Department
SEACOM	Southeast Asia Communications
SPC	Stored Program Control
TASMAN	Tasmania

Table 1.—Australia: Market for communications equipment, 1972-75, projected 1980

(in millions of U.S. dollars)

	1972	1973	1974	1975	1980
Telephone and telegraph apparatus					
Central office exchanges	62.4	78.0	91.8	85.9	123
Private branch exchanges	17.3	23.2	26.1	24.0	33
Transmission equipment/systems	54.8	74.0	85.3	85.3	117
Other[1]	26.3	35.5	45.0	47.3	87
Data communications equipment	4.6	6.5	8.2	8.8	25
Nonbroadcast radio and TV communications equipment					
Mobile radio, land	18.0	23.4	26.6	24.9	37
Mobile radio, marine	2.4	3.3	3.7	3.7	6
Paging systems	1.2	1.8	3.0	3.3	6
Other mobile	.5	.7	1.0	1.2	2
Closed circuit TV	1.8	2.5	3.2	3.3	6
Microwave components[2]	1.9	2.7	3.7	3.5	6
Communications test equipment[3]	8.0	12.0	13.6	14.1	21
Total	199.2	263.6	311.2	305.3	469

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[1] Central office equipment n.e.s. and subscriber/user premises equipment.

[2] Sold separately.

[3] For other than laboratory use.

Source: Bureau of International Commerce, Office of International Marketing research study; values based on official Australian statistics and trade source estimates.

Communications test equipment.—Purchases of communications test equipment by Australian buyers were placed at $13.6 million in 1974; of this amount, 68% was importd. U.S. firms supplied $5 million of these imports. Recessionary pressures have curtailed investments for new equipment by the ATC and other end users, slowing market growth somewhat. Sales from 1974 to 1980 are projected to grow at an average annual rate of 8% and reach $21.2 million; imports are anticipated to rise about 9% annually, reaching $15.8 million. With imports supplying 74% of the overall market for communications test equipment in 1980, demand for U.S. equipment, particularly oscilloscopes, frequency counters, and random-pattern generators, is expected to remain buoyant.

Other Suppliers

Foreign. — Countries supplying the Australian communications equipment market and their respective 1974 import shares are: Germany (23%), Japan (17%), the United Kingdom (9.5%), and Belgium/Luxembourg (9%). Sweden, Italy, and the Netherlands also participate in this market. German firms are a major source of teleprinters and transmission equipment, Japanese companies sell microwave systems, frequency division multiplex, closed circuit TV, and subscriber/user premises equipment.

Important third-country suppliers of communications equipment to Australia include the German company, Siemens A.G.; the Swedish firm, Telefonaktiebolaget L.M. Ericsson; two British firms, Plessey Co. Ltd. and General Electric Co.; and the Dutch company, N. V. Philips Telecommunicatie Industrie. Nippon Electric Co. has made significant inroads in the Australian market, as has another Japanese firm, Mitsubishi.

Austrailan import duties range from 33% to 35%, with marginally lower rates for some members of the British Commonwealth. Equipment not manufactured locally is covered by special laws. The ATC is a member of the ITU and complies fully with CCITT and CCIR standards.

Domestic. — The Australian communications equipment industry consists of about 50 firms employing 23,000 persons. It produced $256.3 million of equipment in 1974, and projected growth indicates production valued at $384.4 million in 1980. Domestically-owned manufacturers supply about a quarter of local production. Among the larger firms are: Amalgamated Wireless (Australasia Ltd.), Olex Cables Ltd., Centre Industries, Conqueror Cables Ltd. and T. R. Services Pty. Ltd.

Subsidiaries and licensees of foreign firms are the most important manufacturers in the Australian communications equipment industry. They include: Standard Telephone and Cable Pty. Ltd., L.M. Ericsson Pty. Ltd., Plessey Pacific Pty. Ltd., Austral Standard Cables Pty., Philips Industries Holdings Ltd. and Siemens Industries Ltd.

Components imported from overseas suppliers include power transistors, integrated circuits, power rectifiers, connectors, silicon diodes, and resistors. Subassembly equipment imported by Australia for incorporation in industry-produced communications systems are central office exchanges, PBX's, mobile radios, and some transmission equipment.

The Communications Network

In 1975, the Australian Post Office relinquished its communications functions to three daughter-organizations: (1) the Australian Telecommunications Commission (ATC) is the organizer of the national telecommunications network; (2) the Postmaster-General's Department (PMG) issues licenses and determines technical specifications and frequency ranges for two-way radio communications systems in Australia, and (3) the Overseas Telecommunications Commission (OTC), in association with the ATC, provides all international telephone, audio broadcast and computer data transfer services, in addition to television relay services via satellite.

In 1959, the Australian Government began automating its telephone service. By 1974, 95% of all services (including 87% of rural services) were automatic. Most of the major centers had automatic service, and of the exchanges with more than 500 services connected, only 70 remained to be converted. Subscriber-dialed calls accounted for 67% of all trunk calls, and by 1980 this proportion is expected to reach 90%.

The Australian Government operates one of the largest broadband networks in the world; with present expansion and improvement plans, this will completely encircle the continent. Presently more than 20,000 km of microwave radio routes are utilized in Australia. Rapid growth of telephone service in major cities has led to increased use of junction circuits provided on coaxial cables. Coaxial cables now make up about 25% and microwave systems the remaining 75% of the network.

As an alternative to the traditional crossbar trunk exchange, the APO installed the first "Stored Program Controlled" (SPC) system in Sydney in 1974. New SPC trunk exchanges are also being installed in Melbourne and Adelaide. The first system had an

Additional Information

This Survey is one of a series based on market research reports prepared overseas for the Office of International Marketing. Other detailed marketing information on Australia is available on a continuing basis from:

Country Marketing Manager—Australia
Office of International Marketing
BIC/DIBA
U.S. Department of Commerce
Washington, D.C. 20230

A copy of the original research which this Country Market Survey summarizes is available at a cost of $10 from:

National Technical Information Service
U.S. Department of Commerce
Springfield, Virginia 22161
Sales desk telephone: (703) 557-4650

The report covers: (1) a detailed description of the national telecommunications network, (2) discussion of the market with special sections on products of particular interest to U.S. manufacturers, (3) descriptions of all major end-user sectors, (4) competitive situation, including U.S., third-country and domestic suppliers, (5) tariff rates, and (6) lists of potential purchasers, trade associations and publications. Please request: "The Market for Communication Equipment and Systems: Australia." DIB #76-05-501, September 1975.

Information on the availability of published standards in Australia may be obtained from the National Technical Information Service, Technical Help to Exporters, Springfield, Virginia 22161.

Table 2.—Australia: Imports of communications equipment, 1972-75, projected 1980
(millions of U.S. dollars)

	1972	1973	1974	1975	1980
Telephone and telegraph apparatus					
Central office exchanges and private branch exchanges, mechanical and electronic, voice	4.1	5.3	6.3	6.7	10
Transmission equipment/systems	8.9	11.4	12.4	14.0	22
Other telephone and telegraph apparatus	11.2	11.8	12.3	16.3	33
Subtotal, telephone and telegraph apparatus	24.2	28.5	31.0	37.0	65
Data communications equipment	1.9	2.6	3.1	3.9	12
Nonbroadcast radio and TV communications equipment	4.3	4.7	7.2	7.0	15
Microwave components [1]	1.1	1.9	3.0	3.1	5
Communications test equipment [2]	5.1	8.8	9.3	10.5	16
Total communications equipment	36.6	46.5	53.6	61.5	113

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[1] Sold separately to manufacturers.

[2] For other than laboratory use.

Source: Bureau of International Commerce, Office of International Marketing research study; values based on official Australian statistics and trade source estimates.

Table 3.—Australia: Imports of communications equipment by counrty of origin, 1974
(in millions of U.S. dollars)

	Total	United States	United Kingdom	Germany	Japan	Belgium/ Luxembourg	Other
Telephone and telegraph apparatus							
Central office and private branch exchanges, mechanical and electronic, voice	6.3	—	.2	.3	.1	4.2	1.5
Transmission equipment/systems	12.4	1.3	1.0	4.3	2.9	—	2.9
Other telephone and telegraph apparatus	12.3	1.6	.7	5.3	2.4	.5	1.8
Subtotal, telephone and telegraph apparatus	31.0	2.9	1.9	9.9	5.4	4.7	6.2
Data communications equipment	3.1	1.2	.5	.8	.2	.1	.3
Nonbroadcast radio and TV communications equipment	7.2	2.7	1.0	.2	2.4	—	.9
Microwave equipment	3.0	1.6	.3	.1	.4	—	.6
Communications test equipment	9.3	5.0	1.4	1.5	.8	—	.6
Total	53.6	13.4	5.1	12.5	9.2	4.8	8.6

Source: Bureau of International Commerce, Office of International Marketing research study; values based on official Australian statistics and trade source estimates.

initial capacity of 12,000 trunklines, but is capable of expansion. The equipment will cater essentially to subscriber trunk-dialing traffic, but high-speed manual assistance is also provided. The ATC also plans to install an SPC system for local exchanges by 1980.

Subscriber switching systems in Australia include keyphones, PBX's and PABX's, and customer booking services. The standard keyphone offering is a fully integrated special telephone having a maximum capacity of 4 exchange or tie lines and direct access to 10 more similar stations. The PBX's are lamp signaling types of two general patterns: console-type cordless for up to 5 exchange lines and 16 extensions, and free-standing cord types, each with a capacity of 20 + 100 that may be multiplied together. As of 1975, approximately 6,500 PABX's were in use in Australia, servicing 500,000 business telephones. Customer booking systems, including automatic call distributors, are generally designed special to suit customer requirements, using traditional PABX crossbar technology.

To handle increased overseas traffic demand, the OTC has established an SPC trunk system in Sydney. Completed in 1974, this system has an initial capacity of up to 10,000 lines. This organization has also been active in establishing a Commonwealth coaxial cable system and has linked Australia with the Western World via SEACOM and COMPAC cables. A trans-TASMAN submarine cable, providing the equivalent of an additional 650 two-way telephone circuits between Australia and New Zealand, was scheduled to be in operation by 1976. Through OTC, Australia has a 2.81% share in International Telecommunications Satellite Organization (INTELSAT) and has four satellite Earth stations; two more are scheduled for operation in 1980. The installation of a national satellite system is also planned.

The ATC has two basic types of service for the transmission of data: Datel exchange lines and Datel private lines. Exchange lines are used for transmitting data at speeds up to 1,200 bits per second (bps) over the switched telephone network, while private lines transmit data up to 4,800 bps on lines of speech bandwidth and 48,000 bps over wider bandwidths. Three 48,000 bps services have been installed to date, and the ATC has 15 applications under consideration. The number of data modems in service from 1975-76 increased 55%, reaching just under 6,000; there are presently about 2,500 dedicated lines in service. A third service operated by the ATC, the Common User Data Network, or CUDN, has been introduced to meet anticipated demand for data transmission and to provide capacity for handling telegraph-type messages such as those sent on leased lines by airlines.

The ATC is the sole supplier of data modems to users of Datel service, except in those instances where the subscriber wishes to operate at speeds not in the standard range. Subscribers leasing circuits from the ATC are not permitted to sublet the circuits to other users.

With the rapid growth of telephone and telex service, the use of telegraph facilities has declined in Australia. Telex service is expanding to take its place, and the ATC intends to replace the current crossbar equipment with an electronic system in the near future. Teleprinters for use in the telex system are provided exclusively by the ATC, which renews its stock of equipment every 3 years.

Major Purchasers

Major improvements in its communications network will continue to make the Australian Govern-

Table 4.—Australia: Projected distribution of communications equipment sales by end users, 1980[1]

(in percent)

		Government											
	Military	Federal[2]	Local	Municipal	Manufacturing	Retail	Banking & Ins.	Transportation[3]	Public utilities	Hospitals	Education	Mining & minerals explor.	Other
Telephone and telegraph apparatus													
Central office exchanges	—	100	—	—	—	—	—	—	—	—	—	—	—
Private branch exchanges	1	40	6	2	8	7	10	10	3	5	4	1	3
Transmission equipment/ systems	1	94	—	—	—	—	—	1	1	—	—	3	—
Other[4]	1	60	4	1	9	5	8	7	1	2	1	1	—
Data communications equipment	4	92	2	—	—	—	—	2	—	—	—	—	—
Nonbroadcast radio and TV communications equipment[5]													
Mobile radio, land	7	12	14	8	4	5	3	25	9	1	—	10	2
Mobile radio, marine	15	15	18	—	—	—	—	23	—	—	—	—	29
Paging systems	1	10	2	2	4	26	15	16	3	17	—	4	—
Other mobile radio	12	20	5	5	3	1	5	12	6	5	—	16	10
Closed circuit TV	3	8	1	1	9	25	15	10	5	4	19	—	—
Microwave components[6]	5	80	8	—	—	—	—	3	—	—	—	4	—
Communications test equipment[7]	9	64	3	4	4	—	—	9	2	—	—	5	—
Total	2	74	3	1	3	13	3	5	1	1	1	2	1

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[1] Figures represent sales to each end-user market segment as a percent of total sales of each type of equipment listed.

[2] Data for the ATC is included here.

[3] Includes rail, marine (cargo and recreational), trucking, taxis, etc. Air transport services excluded.

[4] Central office equipment n.e.s. and subscriber/user premise equipment.

[5] Excludes all air mobile nonbroadcast communications equipment.

[6] Sold separately.

[7] For other than laboratory use.

Source: Bureau of International Commerce, Office of International Marketing research study; values based on official Australian statistics and trade source estimates.

ment the country's single largest purchaser of communications equipment. (See table 4.) Sectors likely to be the most dynamic markets for communications equipment are discussed below. Components purchased by local communications equipment manufacturers have already been mentioned.

Government.—In 1974, approximately $225 million or 82% of total communications equipment sales were made to the Australian Government. For 1980, this sector's purchases are projected at $375 million. Almost all federal purchases were made by the ATC, which had a 1976 budget of $2.5 billion for improvement and extension of Australia's telecommunications network. Plans under consideration by the Government include a national satellite system, an SPC telex system, a time-division multiplex system for data communications, and the introduction of international subscriber dialing.

Demand for nonbroadcast radio and TV communications equipment by military, state, local, and municipal authorities is expected to rise. Military forces in particular will probably need mobile radio equipment, microwave components, and communications test equipment.

A computer-controlled communication center is under consideration by the New South Wales Police Force to control 900 vehicle land mobile stations and land portable and paging operations in Sydney. The Sydney County Council also plans to increase their mobile radio stations.

Transportation. — The transportation sector in Australia accounted for approximtely 12% of gross domestic product and employed about 259,500 workers in 1975. Major areas of expansion include the introduction of a high-speed rail system, expansion of shipping operations, and upgrading the national road system. This sector accounted for 3.5% of communications equipment purchases in 1974 and is anticipated to expand its share of purchases to 5.5%, or $25.8 million, in 1980. High transport and labor costs and increasing reliance on speed and efficiency of travel and communications require greater utilization of mobile radio systems in all forms of transportation. Sophisticated control systems and base stations are becoming more necessary as the number of mobile stations increases.

Retail.—Buoyant consumer demand and construction of regional shopping complexes have contributed to the growth of this industry. In 1974, the retail sector operated 151,121 establishments and employed almost 950,000 people. Introduction of larger outlets is increasing the industry's need for communications equipment. Demand for PBX's, intercom equipment, two-way mobile radios, paging systems, and CCTV is forecast to generate sales of $11.7 million in 1980 and raise the retail sector's share of total communications equipment sales from 1.5% to 2.5% in 1974-80.

Banking and insurance.—Although growth of the Australian banking and insurance industries may slow somewhat in the future, their demand for communications equipment is expected to remain strong. In 1975, 238,600 people were employed by these two sectors. The banking sector comprised 14 major commercial banks and 49 savings banks with 9,925 branches and agencies and held assets of $41.3 billion. The diversification of banks and insurance houses into such commercial areas as travel, construction, and finance, should boost future communications equipment sales. Increased use of data communications equipment and computerized facilities for branch operations, and introduction of CCTV, paging systems, and portable mobile radio for security purposes, is expected to yield sales of $14 million for communications equipment in this sector in 1980. Intercom and land mobile radios will be among equipment most in demand.

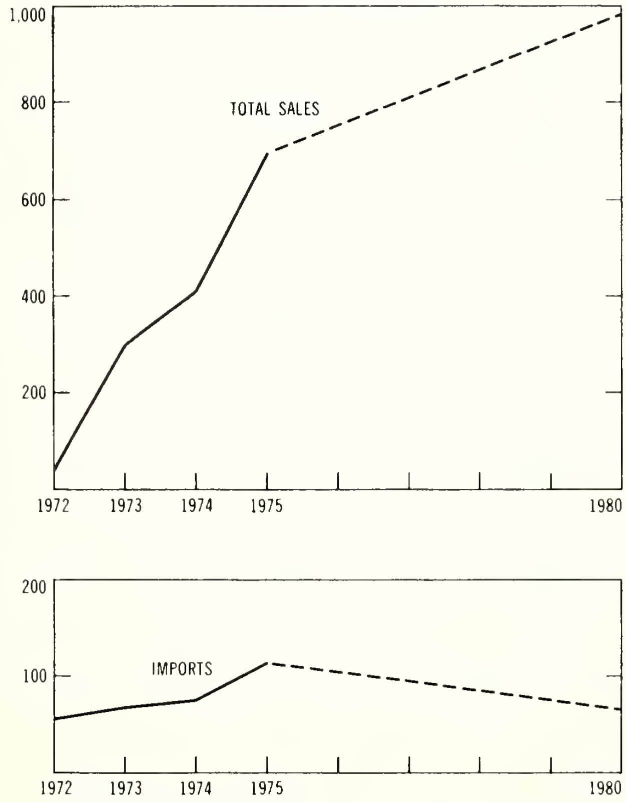
Mining and minerals exploration.—The mining industry employed 64,150 persons and operated 1,315 concerns in 1974. The depressed economic conditions of recent years have slowed its growth. According to trade sources, the Federal Government's policy of encouraging greater Australian ownership in the industry has retarded large-scale foreign investment and postponed new development plans. Sales of communications equipment to the mining sector are forecast at $9.4 million in 1980. Principal items expected to be in demand include transmission equipment and systems used to provide communications with remote sites, PBX's, land mobile radio, microwave components, and test equipment.

Brazil

An extensive and efficient national communications network is essential to the growing economy of Brazil, and the Federal Government plans to continue its ambitious development program regardless of its balance of payments problems. A total government investment of over $10 billion is budgeted for 1975-79, much of which must be spent for imports of highly advanced equipment; the Brazilian Government will purchase domestically whenever possible, and the local communications equipment industry is capable of supplying most standard equipment. Total sales of communications equipment rose from $142 million [1] in 1972 to over $400 million in 1974; 1980 sales are projected at $980 million. (See figure and table 1.)

Brazil: Communications equipment market 1972-75, projected 1980

(in millions of U.S. dollars)



Source: Bureau of International Commerce, Office of International Marketing research study; values based on official Brazilian statistics and trade source estimates.

U.S. Sales Outlook

Imports supplied 17% or $73 million of the Brazilian market for communications equipment in 1974; U.S. manufacturers provided $15.9 million in imported communications equipment in 1974. (See tables 2 and 3.) The Brazilian Government enforces strong policies to promote and protect the local industry at the expense of imports; these include heavy tariffs and surtaxes, complicated licensing procedures and rigidly "buy national" government purchasing policies. As local manufacturers supply an increasing share of this market, imports are expected to decline from their 1975 level of $117 million to $66 million in 1980. U.S. suppliers can continue to hold an important portion of these sales, however, because of their established presence in the market and the need to purchase items not made locally, such as satellite ground station equipment and advanced componentry.

Among the leading U.S. suppliers to the Brazilian communications equipment market are: Hewlett-Packard, electronic test equipment; Hughes Aircraft Co., which provided the Tangua/Itaborai satellite earth segments; and Microwave Associates, Inc., which supplied the PCM radio equipment for TELEPAR. Motorola Inc. Communications Division provides mobile radio equipment and other

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[1] All values are shown in U.S. dollars. Local currency data are converted at the following exchange rates: U.S.$1 = 5.96 Cr. (1972); 6.13 Cr. (1973); 7.33 Cr. (1974); and 8.00 Cr. (1975 and subsequent years).

Brazil—Selected Indicators

Population (1975):	**108 million**
GNP (1975):	**$86.5 billion**
Number of telephones in service (1974):	**2,776,000**
Number of telephone terminals (1973):	**1,774,567**
Number of telex terminals (1974):	**10,330**

communications apparatus; Tektronix Inc. supplies a substantial share of the market for oscilloscopes and frequency counters. RCA Corporation and Collins Radio Co. are also active in this market.

Nonbroadcast radio and TV communications equipment.—The market for nonbroadcast radio and closed circuit television equipment reached $22.8 million in 1975 and is projected to increase to $60 million in 1980. Local manufacturing is well-established and protected by high tariffs, but U.S. suppliers find a market for specialized equipment such as voice-paging systems used by the Federal Government and the military.

In an effort to expand coastal and navigational radio service, the Government has relaxed controls on marine radio equipment imports, particularly for equipment to be installed on new vessels. Most local fishing, trading and recreational craft are poorly equipped for radio communications and represent an untapped market for U.S. marine communications firms.

CCTV is gaining wide acceptance in Brazil for security and operations control in manufacturing and transportation facilities. It is also used in some hospitals and clinics and presently to a lesser extent for educational purposes. Once the local color TV market stabilizes, CCTV may also be applied within the TV industry itself.

Trade sources predict sales of this equipment to reach $3 million at the end of the decade. Despite high tariff rates, Brazilian end users will continue to favor imported equipment because of its unquestioned superiority. U.S. suppliers provided 27% of imported equipment in 1973 and can anticipate a continued market for complete CCTV systems and components (including planning services for customers) and new markets for such auxiliary items as video-recording systems.

Transmission equipment.—Purchases of transmission equipment were valued at $110 million in 1975 and are forecast to rise in volume to $205 million in 1980. Standard equipment in this product category is produced locally, primarily by U.S. and European affiliates, and the Government is increasing its restrictions on imports of microwave and UHF systems, essentially closing this market to U.S. suppliers.

The launching of Brazil's domestic satellite system, scheduled for 1978 will open up the area of greatest sales potential for U.S. producers of transmission equipment. The Brazilian Government will soon invite tenders on the project, and U.S. manufacturers are favored to win the contract. The project also offers a major opportunity for licensed or joint-venture equipment manufacturing agreements.

Other telephone and telegraph apparatus.—In 1975, the size of the market for user-premises and other telephone and telegraph equipment was $119 million. Key-dial handsets, telefacsimile equipment, and telephone-answering and recording devices have been a major sale item for U.S. suppliers. Demand for high- and medium-speed teleprinters used in private telegraph networks and for specialized teleprinters sold as part of larger systems will develop continued opportunities to U.S. suppliers.

Communications test equipment.—Purchases of communications test equipment stood at $23.7 million in 1975 and are forecast to reach $42 million in 1980. This market will continue its heavy reliance on imports. Most imported test equipment is in-

Table 1.—Brazil: Market for communications equipment, 1972-75, projected 1980

(in millions of U.S. dollars)

	1972	1973	1974	1975	1980
Telephone and telegraph apparatus:					
Central office exchanges	34.4	107.5	150.5	365.0	430
Private branch exchanges	21.5	27.5	29.1	30.4	49
Transmission equipment/ systems	37.5	56.5	85.0	110.0	205
Other	33.7	71.7	98.8	119.0	129
Subtotal	127.1	263.2	363.4	624.4	813
Data communications equipment	.6	10.2	14.1	18.8	65
Nonbroadcast radio and TV communications equipment:					
Mobile radio, land	6.2	7.7	9.6	12.1	39
Mobile radio, marine	2.3	2.8	3.3	7.2	9
Paging systems	.5	.6	.8	1.0	4
Other mobile and special UHF/ VHF	—	.3	.5	1.0	4
Closed circuit TV	.6	.6	1.0	1.5	4
Subtotal	9.6	12.0	15.2	22.8	60
Microwave components[1]	—	—	—	—	—
Communications test equipment[2]	4.9	10.2	14.1	23.7	42
Total	142.2	295.6	406.8	689.7	980

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[1] Sold separately.

[2] For other than laboratory use.

Source: Bureau of International Commerce, Office of International Marketing research study; values based on official Brazilian statistics and trade source estimates.

Abbreviations

CCIR—Consultative Committee on International Radio

CCITT—Consultative Committee on International Telephone and Telegraph

TELEPAR—Cia de Telecommunicacoes do Parana (The Parana Telecommunications Company)

TELEBRAS—Telecommunicacoes Brasileiras S.A. (Government holding company for telecommunications service companies)

EMBRATEL—Empresa Brasileira de Telecommunicacoes S.A. (Telebras-owned interstate and international telecommunications service company)

ELETROBRAS—Empresa Brasileira de Eletricidade S.A. (Federal Government holding company for generating companies)

cluded as part of a larger communications system sold by a local supplier, who can ensure its adequate servicing. The actual importing, however, often is done in the name of the end user, who can obtain exemptions from the 20% to 185% applicable tariffs.

Brazilian buyers place a premium on advanced, high-quality test equipment. In 1974, U.S. producers supplied almost a quarter of the country's imported test equipment; despite growing competition, they should hold this strong position in the market. U.S. firms currently find their best sales opportunities for telephone test sets and integrated traffic-measuring systems, but as multinational subsidiaries establish local facilities for production of these items, American manufacturers will shift to sales of frequency counters, oscilloscopes, signal generators, noise-measuring devices, and other advanced test equipment not available locally.

Other national manufacturers selling in the Brazilian communications equipment market are those from Japan (29% of the import market in 1973), Germany (16%), Italy (13%), and the Netherlands (7%). Important companies include the Japanese firms Ikegame Trading Co. and National Division of Matsushita Electric Industrial Co. Ltd.; Italtel of Italy; Thode & Schwartz and Wandel & Goltermann of Germany; Marconi Group (United Kingdom); and Gustave A. Ring System Maskiner A.S. (Norway).

The Domestic Equipment Industry.—The domestic communications equipment industry, consisting of approximately 64 companies, supplied over 80% of the Brazilian communications equipment market in 1974. Trade sources predict that production will reach $1 billion by 1980. Leading domestic manufacturers and the equipment they produce include:

EE-Equipamentos Electronicos S.A.—military radio communications equipment; future producer of

Table 2.—Brazil: Imports of communications equipment,[1] 1972-1975, projected 1980
(in millions of U.S. dollars)

	1972	1973	1974	1975	1980
Telephone and telegraph apparatus:					
Public coin telephone apparatus	.27	.83	.18	.4	.2
Automatic telephone exchange	2.44	1.95	2.79	5.5	2.0
Other telephone apparatus	1.94	2.45	3.52	6.0	4.0
Telegraph apparatus	.27	2.55	1.45	1.5	1.5
Teleprinters, telefacsimile, and other similar apparatus	1.24	1.66	2.44	2.0	2.0
Carrier wave apparatus and other parts for telephone and telegraph apparatus	9.23	6.68	13.53	40.0	4.0
Coaxial cable for telephones	.24	.15	.06	.1	.1
Subtotal	15.63	16.27	23.97	55.5	13.8
Transmitters and receivers for radiotelephony and radiotelegraphy:					
Portable receiver and transmitter	.81	1.02	.82	.5	.5
Receiver for radiotelephony and radiotelegraphy	.25	.27	.45	.8	.8
Receivers, transmitters, and transceivers for vehicles, aircraft, and ships	1.11	1.10	2.38	2.5	3.0
Teleprinters, telefacsimile, and similar apparatus	4.45	6.10	3.89	4.0	5.5
Other	11.42	22.27	23.06	26.0	3.0
Subtotal	18.04	30.76	30.60	33.8	12.8
CCTV	.52	.48	.78	1.2	1.3
Test Equipment:[2]					
Traffic measuring apparatus for telephone exchange	.80	.15	.48	2.7	.5
Equipment for measuring electrical magnitudes (multitester, etc.)	1.18	1.52	1.73	2.2	3.5
Apparatus for measuring electrical magnitude with single indicating function	3.56	4.85	7.02	10.5	17.0
Apparatus for measuring electrical magnitudes with multiple function	4.90	8.13	8.06	10.8	17.4
Subtotal	10.44	14.65	17.29	26.2	38.4
Total	44.63	62.16	72.64	116.7	66.3

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[1] Import categories follow official classifications and do not correspond to Table 1 classifications.

[2] Only a fraction of these are imported for telecommunications.

Source: Bureau of International Commerce, Office of International Marketing research study; values based on official Brazilian statistics and trade source estimates.

Table 3.—Brazil: Imports of communications equipment by country of origin, 1974[1]
(in thousands of U.S. dollars)

	Total	United States	Japan	Germany	Netherlands	Italy	Other
Telephone and telegraph apparatus:							
Public coin telephone apparatus	191	—	27	—	—	—	164
Automatic telephone exchange	2,961	3	640	830	—	23	1,465
Other telephone apparatus	3,865	222	1,503	255	79	408	1,398
Telegraph apparatus	1,502	29	—	228	—	—	1,245
Teleprinter, telefacsimile, etc.	2,566	310	213	228	54	1,406	355
Carrier-wave equipment	14,122	2,576	117	6,307	726	1,124	3,272
Coaxial cable for telephone transmission	76	59	8	2	—	—	7
Subtotal	25,283	3,199	2,508	7,850	859	2,961	7,906
Transmitters and receivers for radiotelephony and radiotelegraphy:							
Portable transmitter and receiver	854	554	119	9	—	—	172
Receiver for radiotelephony or telegraphy	475	213	33	49	—	37	143
Mobile receiver, transmitter or transceiver	2,442	1,980	135	10	251	—	66
Teleprinter, telefacsimile, etc.	4,080	1,192	—	64	—	2,538	286
Other	24,122	4,399	6,948	7,878	65	1,034	3,798
Subtotal	31,973	8,338	7,235	8,010	316	3,609	4,465
CCTV	481	130	293	—	10	46	2
Test equipment:							
Traffic counter for telephone exchange	523	25	34	146	—	58	260
Equipment for testing electrical magnitudes	1,823	930	452	272	60	16	93
Apparatus for testing electrical magnitudes—single	7,441	3,135	1,012	1,072	1,428	43	751
Apparatus for testing electrical magnitudes—multiple	9,119	227	638	1,791	948	48	5,467
Subtotal	18,906	4,317	2,136	3,281	2,436	165	6,571
Total	76,643	15,984	12,172	19,141	3,621	6,781	18,944

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[1] All values given C.I.F., and so are higher than corresponding figures in table 2.

Source: Bureau of International Commerce, Office of International Marketing research study; values based on official Brazilian statistics and trade source estimates.

teleprinters (under license with Sagem, France), PCM multiplex (under license with Marconi, United Kingdom), and digital processing equipment.

Embracom Electronica, S.A.—HT carrier equipment (under license with Lynch, U.S.A.), and radio and open-wire carrier equipment.

Unitel Ind. Electronica S.A.—special UHF radios, control consoles, and VHF radios (under license with Motorola, U.S.A.).

Daruma Telecommunicacoes do Brasil Ind. e Com. Ltda.—pay telephones and traffic-measuring equipment.

Telequipo-Telefones e Equipamentos Ltda.—PBXs.

IGB-Control S.A. Ind e Com. de Aparelhos Eletronicos. — rural subscriber - radio telephone equipment.

Whinner S.A. Ind. e Com.—military communications equipment.

Among the leading multinational companies that have established local subsidiaries are:

Standard Eletrica S.A. (International Telephone and Telegraph Co., U.S.A.).—automatic exchanges, handsets and other subscriber/premises equipment, microwave and multichannel UHF radio, FDM multiplex.

GTE Telecomunicacoes S.A. (General Telephone and Electronics Intl. Inc., U.S.A.).—key systems, handsets, and other subscriber telephone equipment, FDM multiplex; imports complementary subscriber equipment, microwave and UHF radios, PABX.

FICAP-Fios e Cabos Plasticos do Brasil S.A. (L. M. Ericsson, Sweden, and Anaconda Co., U.S.A.).—cables and accessories.

NEC do Brasil Eletronica e Comunicacoes Ltda. (Nippon Electric Co., Japan). — automatic exchanges, telex exchange and transmission equipment, microwave and multichannel UHF radios, and (in the future) PCM Multiplex; imports FDM/PCM multiplex and communications test equipment.

Siemens S.A. (Siemens A.G., Germany.)—automatic exchanges, subscriber premises equipment, (in the future) FDM multiplex; imports telegraph and teleprinter equipment, test equipment, and microwave radios.

AEG-Telefunken do Brasil S.A. (AEG-Tele-

Table 4.—Brazil: Projected distribution of communications equipment sales by end users, projected 1980
(in percent)

		Government											
	Military[1]	Federal	Local	Municipal	Manufacturing[2]	Retail	Banking & ins.	Transportation	Public utilities	Hospitals	Education[3]	Mining & minerals explor.	Other
Telephone and telegraph apparatus:	1	76	1	1	6	1	3	1	3	1	—	1	5
Central office exchanges	—	100	—	—	—	—	—	—	—	—	—	—	—
Private branch exchanges	4	11	5	5	30	4	17	2	5	3	—	2	12
Transmission equipment/ systems	2	82	1	—	—	—	—	2	9	—	—	3	1
Other	4	12	5	5	28	5	14	2	3	3	2	2	15
Data communications equipment	3	39	4	2	8	—	34	2	2	—	—	2	4
Nonbroadcast radio and TV communications equipment:	13	13	—	—	5	—	3	20	13	1	—	13	19
Mobile radio, land	17	4	—	—	5	—	3	13	19	—	—	19	20
Mobile radio, marine	10	10	—	—	—	—	—	60	—	—	—	—	20
Paging systems	—	80	—	—	5	1	—	—	—	5	—	—	9
Other mobile/special radio	—	60	—	—	—	—	—	20	5	—	—	5	10
CCTV	1	3	1	1	30	3	13	20	3	15	9	1	1
Communications test equipment	3	70	—	—	20	—	1	1	2	—	—	—	3
Total	2	70	1	1	7	1	6	2	4	1	—	3	2

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[1] Including police, excluding special military radio products.

[2] Including telecommunications equipment manufacturers.

[3] Excluding tele-education projects.

Source: Bureau of International Commerce, Office of International Marketing research study; values based on official Brazilian statistics and trade source estimates.

funken Int'l., Germany. — microwave and multichannel UHF radios.

Olivetti do Brasil S.A. (Ing. O. Olivetti & C. SpA., Italy).—teleprinters and related equipment, data transmission equipment.

Ericsson do Brasil Com. e Ind. S.A. (L. M. Ericsson, Sweden).—automatic exchanges, handsets, and subscriber equipment; imports telephone equipment, test equipment, multiplex, and radio paging systems.

Philips Eletronica do Nordeste S.A. (Philips Group, Netherlands).—central exchanges, PABX and PBX; imports test equipment and related products.

Inbelsa Division of S.A. Philips do Brasil (Philips Group, Netherlands).—FDM/PCM multiplex, multichannel UHF and microwave radio, military communications equipment.

The Communications Network

The Brazilian Government assumed responsibility for the national telecommunications system in 1962, gradually acquiring the domestic and foreign-owned concessions that controlled various regional networks. The Ministry of Communications was created in 1967 to oversee all communications services (including telecommunications and post); during that year the Government began a massive 15-year program of expansion and upgrading to bring the country's fragmented telecommunications networks to an acceptable standard of performance.

Within the jurisdiction of the Ministry a holding-company, TELEBRAS, was created to manage all telecommunications. TELEBRAS has already acquired all of the important concession-holders and will soon control the smaller ones as well; it plans to establish one organization for each state, all working under its direction. To handle interstate and international telecommunications, TELEBRAS created a separate entity, EMBRATEL, which has become one of the system's most important purchasers of advanced communications equipment. TELEBRAS also has plans to create another organization (TELETEL-EMPRESA) for telegraph and telex service, but this proposal is suspended at present and these services are under the supervision of EMBRATEL.

Microwave line-of-sight systems are commonly used for long-range transmission in Brazil. As of 1974, EMBRATEL had installed a network of 11,500 km with 200 repeater and 70 terminal stations. To cover vast distances in the Amazon basin, EMBRATEL has also installed a microwave tropospheric diffusion network of 51,000 km with 20 stations.

Coaxial cable is seldom used for long-range transmission in Brazil. However, EMBRATEL is expected to order a 500-km, 10,800-channel system for service between Rio de Janeiro and Sao Paulo, although funding difficulties could delay installation. For low-density interurban traffic and for communication with Brazil's Atlantic islands, shortwave radio is favored.

Brazil had 828 international circuits operating in 1975. The country is connected with INTELSAT for both domestic and international communications; SPADE facilities have been installed since 1973. The Government plans to develop a domestic satellite system covering the North and Central-West regions also. The Ministry of Communications has already signed an agreement for the use of a transponder in INTELSAT IVA-F7 Majorpath to improve communications between three state capitals. Two antennas are already in operation at Tangua. The international exchange at Itaborai uses microwave line-of-sight connections to the earth station and Rio de Janeiro. EMBRATEL has also contracted for tracking-monitoring station for INTELSAT IVA at Tangua and a research observation station near Manaus. These programs will give Brazil a total of 810 four-wire channels in operation.

Submarine cables link the north of Brazil to the Canary Islands with 160 voice circuits, and a 640-channel cable will join Brazil with AT&T's Virgin Island cable by 1977. Communications among most Latin American countries are via shortwave radio links; at present, microwave connections with Bolivia, Paraguay, and Uruguay are under construction.

EMBRATEL took over management of Brazil's telegraph and telex systems from the Post Office in 1974. Under the company's program, a new telex system, initially comprising 19 NEC "Wedex" exchanges, was installed; 90 additional units are planned to be in operation by 1980. Between 1974 and 1979, the number of telex terminals should quadruple to 40,420. A Philips automatic retransmission system for telegraph messages, with a center in Rio de Janeiro and concentrators in four major cities, is also being installed; this system will give private and telegraph service access to the international telex system.

Private and leased dedicated lines are used for data transmission, normally at speeds of up to 4,800 bits per second (bps); data transmission on the switched voice network is considered impractical. A digital network of 2,000 terminals is scheduled for installation soon. Exchanges will be installed in the major cities, and the automatic circuit switching system will be equipped to handle speeds up to 9,600 bps.

Major Purchasers

The Brazilian Government will continue to be the country's largest purchaser of communications equipment through 1980. (See table 4.) Other important buyers will include the manufacturing, banking and insurance, and public utilities sectors.

Government. — Approximately 78% or $317.4 million of 1974 communications equipment sales were made to the Brazilian Government. Although recessionary pressures, brought on by the petroleum crisis, have compelled the Government to review its $10.9 billion communications networks investment program, equipment purchases are forecast to reach $725 million by 1980.

Although government purchases tend to favor locally manufactured equipment, official enthusiasm for modern technology allows for imports of more advanced equipment. Federal, state, and municipal governments all provide a steady market for basic communications equipment but purchases of more sophisticated systems are usually made by the federal Government, the Sao Paulo and Rio de Janeiro municipal governments and a few of the richer state governments.

Many federal departments maintain their own radio communications networks. The armed forces, in particular, form an important market for radio communications equipment, preferring the design and reliability of imported items to those of domestically manufactured goods. The Federal, state, and high-

Additional Information

This Survey is one of a series based on market research reports prepared overseas for the Office of International Marketing. Other detailed marketing information on Brazil is available on a continuing basis from:

Country Marketing Manager—Brazil
Office of International Marketing
BIC/DIBA
U.S. Department of Commerce
Washington, D.C. 20230

A copy of the original research which this Country Market Survey summarizes is available at a cost of $10 from:

National Technical Information Service
U.S. Department of Commerce
Springfield, Virginia 22161
Sales desk telephone: (703) 557-4650

The report covers: (1) a detailed description of the national telecommunications network, (2) discussion of the market with special sections on products of particular interest to U.S. manufacturers, (3) descriptions of all major end-user sectors, (4) competitive situation, including U.S., third-country and domestic suppliers, (5) tariff rates, and (6) lists of potential purchasers, trade associations and publications. Please request: "The Market for Communication Equipment and Systems: Brazil." DIB 76-05-502, January 1976.

Information on the availability of published standards in Brazil may be obtained from the National Technical Information Service, Technical Help to Exporters, Springfield, Virginia 22161.

way police have shown a growing interest in vehicle and portable pocket transceivers and large purchases are anticipated.

Manufacturing. — Brazil's manufacturing industries had an estimated total labor force of 2.8 million and shipments valued at $37.5 billion in 1974. Despite a slowing of production in recent years, aggravated by balance of payments problems, the sector is expected to continue as a prime market for communications equipment. Purchases, valued at $28.5 million in 1974, are projected to reach nearly $70 million by 1980.

Large manufacturers, particularly multinational subsidiaries, are among the country's prime users of advanced telex, CCTV and data transmission equipment. Because of the unreliability of the Brazilian postal system, firms are heavily dependent on the telephone network for communications. Consequently Brazilian industry offers a continuing demand for basic telephone equipment, such as single handset lines, key systems, and PBXs. Government incentives to relocate factories away from southern urban centres to the northern regions of Brazil should also increase the demand for modern and expanded communications facilities.

Banking and insurance.—In 1975, approximately 102 commercial banks held combined assets of $19.5 billion in Brazil; with a total 7,700 branches. Other financial institutions included: 219 other types of banking organizations (government savings, building societies, savings and loan, etc.), with assets of nearly $30 billion; 90 insurance companies (in 1974), with total collected premiums of $950 million; and 300 credit cooperatives.

A move toward rationalization in this sector during the early 1970's precipitated a strong demand for advanced data processing and transmission equipment. Despite a recent slowdown in the construction of new facilities, continued demand for communications equipment should bring a quadrupling in purchases between 1974 and 1980, with sales projected to rise to about $60 million by the end of the decade. Acquisitions of data communications equipment are estimated to grow to $22 million in 1980; banking and insurance sector purchases are predicted to rise from 10% to 34% of total data communications equipment sales in the 1974-80 period.

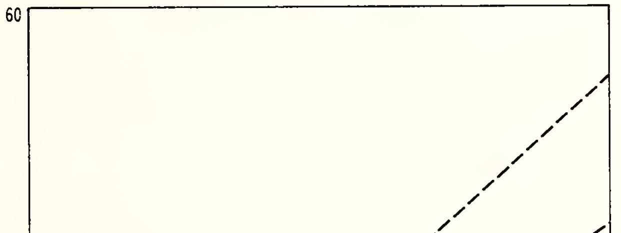
Public utilities.—The public utilities in Brazil include 27 electric power utilities with a 1974 net worth of $6.1 billion, and 34 firms providing water, garbage, sewage and piped gas services with total assets of $1.1 billion in 1975. Purchases of communications equipment by this sector are forecast to grow from $12.2 million in 1974 to $40 million in 1980.

Electric power generation is a priority sector in the national development plan and so is eligible for import tariff exemptions. With the exception of one private company (Light-Servicos de Eletricidade S.A.) all electric companies are controlled by the national utility ELETROBRA or by the individual state governments. However, because of the unreliability of the present public networks, the large generating companies have received permission from the Ministry of Communications to install their own communications networks. These firms are given considerable leeway in determining their import needs and are major users of transmission equipment such as high-tension carrier equipment, microwave line-of-sight systems and multichannel UHF systems. Private branch exchanges, mobile radio data transmission equipment and more advanced types of subscriber/premises equipment are also used by the utilities, who usually buy them as packaged systems.

Colombia

Government plans to consolidate and expand its telecommunications network, together with strong demand from the private sector, ensure a dynamic market for communications equipment in Colombia at least through the early 1980's. Sales of communications equipment, valued at $31 million[1] in 1975, are forecast to grow to over $55 million in 1970. (See figure and table 1.) Purchases of telephone and telegraph apparatus have traditionally dominated the Colombian communications equipment market, but more specialized equipment is expected to take a larger market share as public and private enterprises continue to modernize their telecommunications systems.

Columbia: Communications equipment market
1972-75 projected 1980
(In millions of U.S. dollars)



Source: Bureau of International Commerce. Office of International Marketing Report; values based on official Colombian statistics and trade estimates.

U.S. Sales Outlook

Imports supplied $26.3 million or approximately 85% of the overall communications equipment market in 1975 (see table 2), and trade sources project growth that will bring the value of imports to $44.9 million in 1980. Local production in all segments of the communications equipment market is expected to remain small, so that imports will continue to provide a major portion of the total market for the next 5 years.

U.S. suppliers provided 28% or $7.7 million of Colombia's total imports in 1974 and are forecast to capture a 35% share of the import market by 1980. American communications equipment should find growing markets, particularly in the private sector, where these products are already highly regarded for quality. Price, long-term credits, technological sophistication and training services are important factors influencing purchasing decisions in the public sector.

Important Columbian markets for U.S. manufacturers of communications equipment are described below:

Telephone and telegraph apparatus.—Sales of telephone and telegraph apparatus, valued at $24.7 million in 1974, represent the largest segment of the communications equipment market; increased consumer demand is expected to bring sales of $42.4

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[1] All values are shown in U.S. dollars. Local currency data are converted at the following exchange rates: US$1=22.02 pesos (1972), 23.81 pesos (1973), and 27.30 pesos (1974 and subsequent years).

Colombia—Selected Indicators

Population (1975):	**23.6 million**
GNP (1975):	**$8.68 billion**
Number of telephone lines in operation (1974):	**883,337**
Number of main stations (1974):	**305**
Number of installed telex subscriber lines (1974):	**3,294**

million in 1980. Imports supplied well over 85% of this market in 1974, of which U.S. firms provide $4.3 million in telephone and telegraph equipment that year. (See table 3.) Based on the Columbian Government's plans for the integrated development of local automatic service and the expansion of its long-distance, telegraph, and telex networks, U.S. suppliers can expect to substantially increase future sales of equipment in this product category, particularly in the fields of transmission and subscriber/user equipment. Lack of equipment standardization and liberal government import policies make this market particularly accessible to foreign suppliers.

Transmission equipment.—Sales of transmission equipment was valued at $3.8 million in 1974, and sales are projected to reach $5.7 million in 1980. Purchases from U.S. manufacturers represented approximately 20% of this market subcategory for 1974. Sophisticated systems, such as Pulse Code Modulation (PCM) and Power Line Carrier (PLC), have already been introduced in Colombia. Use of microwave/multiplex systems should continue to increase through 1980, providing promising sales opportunities for U.S. suppliers of video and digital microwave transmission systems, microwave parabolic antennae, waveguides and modulators. Multiplex equipment expected to be in demand includes: VHF, UHF and microwave frequency division 72 to 1,260 channels.

Subscriber/user premises equipment.—Colombian users are projected to increase purchases of this equipment from $7 million in 1974 to $17 million 1980. Imports are forecast to rise from $5.6 million to $13.8 million in the same year. U.S. firms, which supplied just over 50% of 1974 imports, should benefit from this market growth, with demand for key system, intercoms, handsets, teleprinters, and to a lesser extent, telephone answering devices, providing the increased sales.

Communications test equipment.—Purchases of communications test equipment by Colombian buyers stood at $690,000 in 1974. U.S. firms supplied about 63% of the $640,000 import market for the same year. With the installation of central office exchanges by Telecom and the major telephone companies, the use of high-grade communications test equipment is expected to nearly triple to $1.9 million in 1980. As Telecom takes over the operation of local telephone companies, plans call for the replacement and reconditioning of a considerable portion of existing equipment. This effort should offer good sales potential for U.S. manufacturers of microwave modulators, oscillators and oscilloscopes, voltohmmeters, sweep and signal generators, spectrum analyzers, and frequency counters. In view of the continuous expansion of Colombia's microwave trunk system, microwave modulators present particularly good prospects for U.S. suppliers to increase their market presence.

Data communications equipment.—Sales of data communications equipment are projected to more than double between 1974-80, reaching $2.8 million in the latter year. Imports, which in 1974 supplied 75% of the Colombian market for data communications equipment, are projected to account for 82% in 1980. U.S. manufacturers sold nearly $1 million in equipment in 1974, and held a strong competitive

Table 1.—Colombia: Market for communications equipment, 1972-75, projected 1980

(in millions of U.S. dollars)

	1972	1973	1974	1975	1980
Telephone and telegraph apparatus					
Central office exchanges	8.87	9.11	11.98	10.86	17.2
Private branch exchanges	1.56	1.58	1.93	1.46	2.5
Transmission equipment/systems	1.56	.86	3.79	2.17	5.7
Other[1]	9.18	15.70	6.99	9.93	17.0
Data communications equipment	.16	.24	1.24	1.30	2.8
Nonbroadcast radio & TV communications equipment					
Mobile radio, land	1.23	1.03	2.85	2.23	3.7
Mobile radio, marine	.02	.05	.08	.09	.3
Paging systems	—	—	.02	.03	.1
Other mobile equipment	.02	.02	.05	.06	.2
Closed circuit TV	.34	.46	1.00	.97	1.9
Microwave components[2]	.16	.33	.83	1.05	2.0
Communications test equipment[3]	.33	.34	.69	.80	1.9
Total	23.43	29.72	31.45	30.95	55.3

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[1] Central office equipment n.e.s. and subscriber/user premise equipment.

[2] Sold separately.

[3] For other than laboratory use.

Source: Bureau of International Commerce, Office of International Marketing research study; values based on official Colombian statistics and trade source estimates.

Abbreviations

CAR	**Corporacion Autonoma Regional de la Sabana de Bogota y de los Valles de Ubate y Chiquinquira (The Independent Regional Company of the Bogota Savanna and the Ubate and Chiquinquira Valleys)**
CCIR	**Consultative Committee on International Radio**
CCITT	**Consultative Committee on International Telephone and Telegraph**
CVC	**Corporacion Autonoma Regional del Valle del Cauca (The Cauca Valley Autonomous Regional Company)**
EDA	**Empresas Departamentales de Antioquia (The Antioquian Departmental Companies)**
EMC	**Empresas Municipales de Cali (The Public Companies of Cali)**
EPM	**Empresas Publicas de Medellin (The Public Companies of Medellin)**
ETB	**Empresa de Telefonos de Bogota (Telephone Company of Bogota)**
ETBoy	**Empresa de Telefonos de Boyaca (The Boyaca Telephone Company)**
IBRD	**International Bank for Reconstruction and Development**
IDB	**Inter-American Development Bank**
ITU	**International Telecommunications Union**
TELECOM	**Empresa Nacional de Telecommunicaciones (National Telecommunications Agency)**

lead in this field. As the Colombian economy develops, the increasing complexity of business procedures conducted by the public administration should generate additional demand for all types of U.S.-manufactured data communications equipment.

Nonbroadcast radio and TV communications equipment.—Sales of equipment in this product category were $4 million in 1974 and are forecast to increase to $6.2 million in 1980. U.S. firms held a 63% share of the import market in 1974, supplying $1.9 million of equipment. Trade sources anticipate high demand for mobile radio equipment and CCTV systems during the next 5 years.

Use of land mobile radios in police cars, fire trucks, ambulances and taxicabs is expected to rise as the public service sector expands and upgrades existing equipment. Several public utilities and large private farm and ranch owners, already utilizing mobile radio equipment for communications with their installation/maintenance personnel, should provide a ready market for advanced mobile radio equipment. The prospects for sales of U.S.-made marine mobile radios are also promising. The Colombian Port Authority and two large fishing companies are currently in the market to purchase VHF marine radio equipment.

Colombian purchases of CCTV increased rapidly between 1972 and 1974 and are forecast to nearly double by 1980. The market offers excellent potential for U.S. suppliers of high-quality CCTV, particularly in the educational sector and in the security/control areas of hospitals, banking, manufacturing, and retail establishments. About 25 CCTV systems were operating in 1974. U.S. firms supplied 29% of the imports of CCTV equipment in 1974 and can expect to further penetrate this market by emphasizing the high quality and operational superiority of American-made products over those manufactured by third-country competitors.

Major suppliers.—Among leading U.S. suppliers

Table 2.—Colombia: Imports of communications equipment, 1972-75, projected 1980

(in millions of U.S. dollars)

	1972	1973	1974	1975	1980
Telephone and telegraph apparatus					
Central office exchanges, mechanical and electronic, voice	8.87	9.11	11.30	9.33	14.0
Private branch exchanges, mechanical and electronic, voice	1.21	1.24	1.54	1.24	2.1
Transmission equipment/systems	1.55	.86	3.57	1.87	4.6
Other	7.61	13.02	5.58	8.29	13.8
Subtotal, telephone and telegraph apparatus	19.24	24.23	21.99	20.73	34.5
Data communications equipment	.10	.19	.93	1.10	2.3
Nonbroadcast radio & TV communications equipment					
Mobile radio, land	.79	.82	2.18	1.90	3.1
Mobile radio, marine	.02	.04	.06	.09	.2
Paging systems	.01	—	.02	.03	.1
Other mobile equipment	.01	.01	.04	.05	.1
Closed circuit TV	.24	.33	.76	.83	1.5
Subtotal, nonbroadcast radio & TV communications equipment	1.07	1.20	3.06	2.90	5.0
Microwave components[1]	.76	.33	.78	.89	1.6
Communications test equipment[2]	.22	.23	.64	.68	1.5
Total, communications equipment	21.39	26.18	27.40	26.30	44.9

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[1] Sold separately to manufacturers.

[2] For other than laboratory use.

Source: Bureau of International Commerce, Office of International Marketing research study; values based on official Colombian statistics and trade source.

Table 3.—Colombia: Imports of communications equipment by country of origin, 1974
(in millions of U.S. dollars)

	Total	USA	Sweden	Germany	Japan	France	Others
Telephone and telegraph apparatus							
Central office exchanges	11.30	.45	6.33	1.36	.79	1.47	.90
Private branch exchanges	1.54	.31	.76	.31	.08	—	.08
Transmission equipment/systems	3.58	.72	.07	1.43	1.07	.11	.18
Other	5.58	2.81	.59	.16	.13	.57	1.32
Subtotal	22.00	4.29	7.75	3.26	2.07	2.15	2.48
Data communications equipment	.93	.93	—	—	—	—	—
Nonbroadcast radio and TV communications equipment							
Mobile radio, land	2.18	1.63	—	—	.22	—	.33
Mobile radio, marine	.06	.04	—	—	.01	—	.01
Paging systems	.02	.02	—	—	—	—	—
Other mobile equipment	.04	.03	—	—	.01	—	—
Closed circuit TV	.76	.22	—	.08	.38	.04	.04
Subtotal	3.06	1.94	—	.08	.62	.04	.38
Microwave components	.78	.19	—	.08	.27	.12	.12
Communications test equipment	.64	.40	.02	.07	.07	.01	.07
Total	27.41	7.75	7.77	3.49	3.03	2.32	3.05

Source: Bureau of International Commerce, Office of International Marketing research study; values based on official Colombian statistics and trade source estimates.

to the Colombian communications equipment market are International Telephone and Telegraph and General Telephone and Electronics. IBM is the major manufacturer of data communications equipment, and Motorola, RCA, General Electric and Comco are active in the sale of mobile radio equipment, Telemation and Ampex Pan American supply the CCTV market, and Hewlett-Packard, Texas Instruments, and Tektronix are sellers of communications test equipment.

Leading third-country suppliers to the Colombian communications equipment market and their respective share of imports in 1974 were: Sweden (28%), Germany (12%), Japan (11%) and France (9%).

Prominent companies include: L. M. Ericsson of Sweden, holding a large share of the telephone and telegraph switching and subscriber/user premises equipment market; Siemens of Germany, active in the same market; NEC, OKI, and Fujitsu of Japan, selling transmission equipment and microwave components; Hitachi, Sony, and National Panasonic, CCTV equipment.

By Colombian law all large Government purchases of telephone equipment in excess of 40% of existing capacity, must be made through international tenders. Foreign firms should be preregistered with the office issuing the tender, and normally are required to have local representation before submitting bids.

The Communications Network

The National Telecommunications Agency, or "Telecom", is an autonomous government agency responsible for operation of all long-distance telephone, telegraph, and telex services and international communications in Colombia. Two local systems, EDA in Antioquia state and ETBoy in Boyaca, also provide interurban telephone services in their respective areas. A large share of local service is provided by 53 different companies, all operated by municipalities and state governments. These range in size from very small systems to such giants as those serving Bogata and Medellin. Telecom plans to gradually take over control of all the largest of these companies, although this plan is still not a definite one. In areas that these companies do not serve, Telecom provides services. The Ministry of Communications is responsible for policy, licensing, and regulation of the various telephone and communications firms; it must approve all investment programs and rate changes requested by the independent companies. The Ministry of Finance reviews expansion plans to ensure compliance with regulations governing international credit and lending. As a member of ITU, the Colombian Government generally adheres to CCITT and CCIR standards.

The telecommunications system in Colombia at present is considered highly fragmented. In general, a large unfilled demand, congestion on both local and long-distance networks, and a high fault incidence due to poor maintenance and management have resulted in unsatisfactory telephone service.

In late 1974, approximately 148 local automatic and 362 manual exchanges had been installed in 194 localities. At that time, 48% of total telephone subscribers were industrial and commercial users, 47% residential and 5% government.

About 50% of long-distance service in Colombia

Table 4.—Colombia: Projected sales distribution of communications equipment by end users, 1980[1]

		Government											
	Military	Federal[2]	Local	Municipal	Manufacturing	Retail	Banking & Ins.	Transportation[3]	Public utilities	Hospitals	Education	Mining & minerals explor.	Other
Telephone and telegraph apparatus													
Central office exchanges	—	40	—	—	—	—	—	—	60	—	—	—	—
Private branch exchanges	2	11	3	3	18	7	16	3	25	4	5	2	1
Transmission equipment/ systems	6	82	—	—	—	—	—	—	12	—	—	—	—
Other[4]	2	16	3	2	15	4	15	2	33	3	2	1	2
Data communications equipment	—	41	—	—	11	5	22	—	6	7	1	5	2
Nonbroadcast radio and TV communications equipment[5]													
Mobile radio, land	17	7	6	7	14	7	3	11	10	6	2	8	2
Mobile radio, marine	20	30	—	—	—	—	—	30	—	—	—	—	20
Paging systems	—	—	—	—	30	—	—	—	20	30	—	—	20
Other mobile radio	10	8	3	3	20	2	2	22	10	10	—	5	5
Closed circuit TV	—	6	—	—	8	8	8	—	—	10	60	—	—
Microwave components[6]	15	70	—	—	—	—	—	—	15	—	—	—	—
Communications test equipment[7]	5	50	—	—	—	—	—	—	40	—	5	—	—
Total	3	34	2	1	7	3	6	2	34	2	3	1	2

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[1] Figures represent sales to each end-user market segment as a percent of total sales of each type of equipment listed.

[2] Data for Telecom is included here.

[3] Includes rail, marine (cargo and recreational), trucking, taxis, etc. Air transport services excluded.

[4] Central office equipment n.e.s. and subscriber/user premise equipment.

[5] Excludes all air mobile nonbroadcast communications equipment.

[6] Sold separately.

[7] For other than laboratory use.

Source: Bureau of International Commerce, Office of International Marketing research study; values based on official Colombian statistics and trade source estimates.

is provided by microwave radio systems, 15% by physical lines multiplex systems, 17% by VHF/ UHF, 8% by HF radio, and 10% via satellite systems. Facilities for self-dialed long-distance calls are available to most subscribers on the automatic exchange network; otherwise, this service is semiautomatic or manual.

Colombia has good international telephone communications with Central and South America, Europe and the United States. Services are provided either through HF radio to Panama, UHF radio to Venezuela and Ecuador, submarine cable with the United States, or Earth satellite stations. At present there are 80 international telephone circuits in service; Telecom plans to expand this number to 182.

Although stepping and crossbar switching are used most frequently in Colombia, semielectronic switching has also been introduced, and more contracts for its use are expected in the near future. In PABXs, electromechanical switching predominates.

Colombia's microwave trunk system was inaugurated in 1968 and has been expanded considerably since then. The network has an extension of over 2,600 km, used for telephone, telegraph, telex, telephoto, and television transmissions. Because of their capacity and quality, these systems are presently and will continue to be among the most important areas of development in the Colombian telecommunication system. The country's first Earth satellite station was established in Choconta in 1970. It has an installed capacity of 132 circuits, of which 93 are in operation—80 for telephone service, 9 for telegraph and telex operations and 4 leased circuits.

Colombia's only data transmission facilities are operated by government agencies or private companies, always for their own use. Most of these are leased from IBM's local subsidiary. Users include the Finance Ministry, the National Petroleum Company and the National University. This number is expected to grow considerably as other institutions establish their own data transmission facilities.

Telecom and the Bogata Telephone Company provide transmission services for these systems. Existing telephone networks have the capacity to transmit at 4,800 and 9,600 bps. Telecom plans to establish a public, nonvoice data transmission service in the near future.

Of the 1,600 telegraph offices in Colombia in 1974, about 200 were connected to the national telex network. Colombia's telex system consists of six interconnected automatic regional centers. Existing switching equipment is electromechanical, but electronic systems are being introduced. The transmission equipment installed at terminals is all electronic, and telex transmission is effected to a large extent through microwave carrier systems. During 1968-73, the number of telex subscribers increased 5% annually, but trade sources anticipate a 12%

annual increase in subscribers now that international telex via satellite circuits has been introduced.

Telecom's present plans include extension of the microwave trunk system, long-distance service, and new interurban switching systems; acceleration of the agency's acquisition of local telephone enterprises; and expansion of telegraph/telex service into new localities.

Major Purchasers

The Colombian Government will remain the country's single largest purchaser of communications equipment through 1980. (See table 4.) Other important buyers include the public utilities, manufacturing and banking and insurance sectors.

Government.—Over 40% to $13.2 million of all 1974 communications equipment purchases were made by the Colombian Government. The IBRD has loaned the Government $53 million to finance its telecommunications expansion program through 1980, although this money may be expended before that date. Telecom's current projects cover the installation of microwave, VHF/UHF radio terminals and further utilization of multiplex equipment. Plans for greater use of switching equipment, distribution cables, and subscriber/user premises equipment, and the expansion of telex operations and call office facilities for rural towns, are also under consideration. These investments could generate Government demand for communications equipment in excess of $23.2 million in 1980.

To accelerate the modernization of the communications network, Telecom submitted a further $40-million loan request to IBRD in 1976. A Rural Telephone Development Program projected to cost $30 million, and partially financed by a $10-million IDB loan, is expected to generate substantial new demand for telephone equipment. Two regional organizations, CVC in the state of Valle and CAR in Cudinamarca and Boyaca, are carrying out their own rural telephone development plans and so are interested in accepting tenders.

Public utilities.—The public utilities sector in Colombia is comprised of three service areas: water and sewer supply, electric energy, and local telephone services provided by municipal and state-owned companies. Together these end users employed 26,000 persons and purchased $11.6 million or 37% of all communications equipment sold in 1974.

The water and sewer supply sector is projected to expand steadily as the Colombian Government implements programs to extend water supply and sewerage facilities to at least 80% of the urban population by 1980. Manufacturers of PABX's, telephone subscriber/user premises equipment and mobile radios are expected to find favorable outlets for their products.

Installed electric capacity is forecast to increase an average 13% annually between 1974 and 1980. As a result, electric companies are expected to expand their use of communications equipment, particularly mobile radios. These companies also plan to acquire PLC transmission systems. Interconexion Electrica S.A., a local Colombian firm, is in the process of establishing a network of control and communications stations to supervise its electric power transmission operations through a computerized system.

Of the 53 municipally-or state-owned and operated telephone companies, three have 5-year Telephone Development Plans. The Bogota Company, ETB, is interested in electronic and semielectronic central exchanges, and plans to install 271,600 additional lines through 1980. EPM, in Medellin, intends to increase installed capacity by 298,600 during the same period, while 65,000 additional lines will be put into operation by EMC in Calc. This last

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company is also considering the installation of a data communications system and of more sophisticated telephone transmission equipment on a trial basis. Expansion programs by other utitities, including a rural telephone development plan favoring the use of multiplex radio transmission equipment, are expected to yield sales of communications equipment in excess of $18.8 million in 1980.

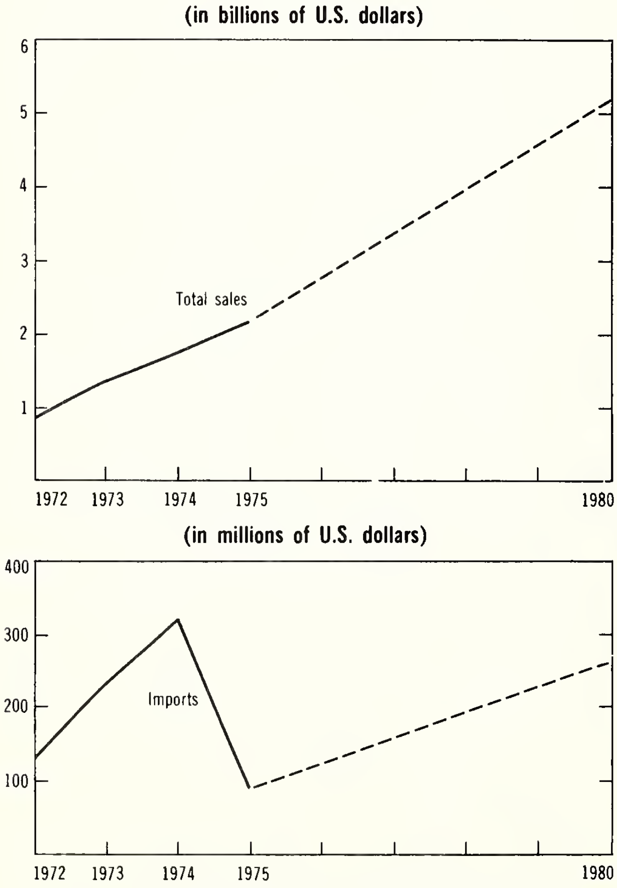
Manufacturing.—Total assets of the manufacturing sector were valued at nearly $5 billion and employment at 429,912 persons in 1973; the sector purchased $2.2 million in communications equipment in 1974. As the economy recovers from its recent slowdown, sales of communications equipment to manufacturers should pick up momentum, reaching $3.9 million in 1980. Best sales prospects in the sector are for PABXs, land mobile radio, paging systems, CCTV systems, and data transmission equipment. Three large Colombian companies are currently planning to install data transmission facilities and more are anticipated as industries located outside the capital improve their communications networks.

Banking and insurance.—The Columbian banking sector is expanding rapidly, establishing 901 new branches and introducing service to 157 towns since 1965. The banking sector's assets totaled $2.8 billion and employees numbered 52,000 in 1974. The insurance sector comprises 66 companies with a labor force of 6,000 and assets of $288 million. As the Colombian economy expands, the greater use of data communications system for branch operations, utilization of PABXs, subscriber/user premises (telephone apparatus, key system, intercoms, teleprinters) and CCTV systems, are projected to bring sales of $3.9 million for communications equipment to this sector.

France

A much needed national program to upgrade and expand France's communications network is expected to propel the French communications equipment market from a 1975 level of $2.1 billion[1] to over $5 billion by1980. (See figure and table 1.) The Government's telecommunications authority, the Ministere des Postes et Telecommunications (PTT), accounts for about 70% of these purchases; by policy, it supports local manufacture whenever possible.

France: Communications equipment market 1972-75, projected 1980



Source: Bureau of International Commerce, Office of International Marketing research study; values based on official French statistics and trade estimates.

U.S. Sales Outlook

Communications equipment imported into France was valued at $322 million in 1974, of which nearly $118 million came from the United States. (See tables 2 and 3.) Foreign manufacturers find the most lucrative markets in the private user-sectors, where government technical regulations are less strict than in the public sector. The United States is a major exporter to France of communications equipment, especially in the area of teleprinters, modems, test equipment and microwave components. Telex and paging equipment are areas of good growth potential for U.S. manufacturers.

To the greatest extent possible, the PTT procures its communications equipment from two French manufacturing cartels, SOCOTEL (telephone and telegraph equipment) and SOTOLEC (data communications equipment). Although as a matter of policy, the PTT does not wish to close the door to foreign suppliers, in practice, the great bulk of communications equipment is purchased from domestic suppliers. Imports of communications equipment to France are generally inhibited by the mandatory PTT approval for all telephone and telegraph, data communications, and nonbroadcast radio equipment. Documentation detailing approved technical characteristics and standards is sparse, and approval procedures vigorous and time-consuming.

Recent economic conditions make price and credit terms important considerations to French buyers. Equipment rental and leasing are becoming

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[1] All values are shown in U.S. dollars. Local currency data are converted at the following exchange rates: US$1 = 5.05 francs (1972), 4.45 francs (1973), and 4.68 francs (1974 and subsequent years).

France—Selected Indicators

Population (1975):	**52,590,000**
GNP (1975):	**$276 billion**
Number of telephones (1974):	**12,405,000**
Number of main lines (1975):	**6 million**
Number of telex subscribers (1974):	**47,533**
Number of computers (1975):	**10,130**

a common practice in the face of tight credit and rising costs.

Equipment offering the best sales prospects to American manufacturers is described below:

Telephone and telegraph apparatus.—Anticipated market growth of 20% annually in 1974-80 should escalate sales of this equipment to over $4.3 billion by 1980; the lion's share of demand will be satisfied domestically. Equipment made in the United States accounted for over 60% of total 1974 teleprinter imports or $4.2 million. Teleprinter imports are predicted to reach $16.5 million by 1980, and U.S. firms are expected to maintain their present position. The French firm SAGEM has the favored position in sales of telex machines to the PTT system, but not in the private sector, leaving a potential gap which U.S. suppliers can fill.

Data communications equipment.—Sales of data communications equipment reached $67 million in 1974 and are expected to total about $200 million by 1980. The total number of computers in France has increased 20% annually since 1972; half are of U.S. origin. New PTT data systems are bringing substantial growth in sales of modems to the public sector. Up to now 9,600 bits per second (bps) modems have been provided solely by U.S. manufacturers, but are now becoming available from French suppliers as well. Short term prospects should remain favorable for orders of frequency and phase modulated modems, switching devices, multiplexers, and concentrators.

Nonbroadcast radio and TV communications equipment.—Sales of mobile radios are forecast to reach nearly $400 million in 1980, advancing at a predicted average annual rate of over 17% from their 1974 level of $246.2 million. In the long term, the mobile radio market may be most promising for American-manufacturer equipment if American equipment can be made compatable with French-required frequency spacing without increasing costs. PTT regulation exists in this area, but is less stringent than elsewhere.

Sales of paging system equipment are predicted to almost double over the period 1974-80, reaching $40 million by the end of the period. Short-range paging systems may offer potential for expanded U.S. sales, and PTT involvement in this field is minimal.

Microwave components. — Between 1974 and 1980, the market for microwave components is expected to grow from $700 thousand to $2 million. Thomson-CSF of Canada produces more than 90% of French imported microwave components. Stiff price competition exists, but generally the technical superiority of U.S.-made components ensures a continued share of the market.

Communications test equipment.—Sales of test equipment are forecast to triple in the 1974-80 period to reach $90 million. Since 1972, imports of telecommunications test equipment have grown enormously, but the 1974 U.S. share was only 5%. American suppliers held a 38% import market share of general electronic test equipment. Trade sources indicate that from 1974 to 1980, American suppliers are expected to maintain and probably improve their position in the market because of the superior performance and the wide range of equipment available.

Third-country suppliers provided only a small portion of the French communications equipment market over the 1972-75 period. German firms are the most active of these, particularly Siemens, which provides a full range of telephone equipment, and Wantel and Golterman, supplying test equipment. Denmark, Japan, and the United Kingdom are also active in the market.

Domestic Equipment Industry. — The French communications equipment industry consists of 92 significant manufacturers which, in 1974, employed 87,000 persons. The most important manufacturers belong to the two government-sponsored cartels, SOCOTEL and SOTOLEC mentioned earlier, which act as the principal suppliers for the PTT. These groups include a few foreign-owned subsidiaries. Domestic production, valued at $2 billion in 1974, is forecast to triple by 1980.

In 1972, the leading domestic communications equipment suppliers and their chief area of production were:

Societe Anonyme de Telecommunications—transmission, non-broadcast radio equipment
Association des Ouvriers en Instruments de Precision—exchanges, nonbroadcast radio equipment
Societe d'Applications Generales d'Electricite et de Mecanique—telegraph equipment
Societe d'Etudes et de Construction Electroniques —nonbroadcast radio equipment
CIT-Alcatel (licensee of Ericsson, Sweden)—exchanges, telephone and telegraph transmission equipment

Telecommunications Radioelectriques et Telephoniques (licensee of Philips, Netherlands)—telephone and telegraph transmission and nonbroadcast radio equipment
IBM (subsidiary of IBM, U.S.A.)—exchanges
Thomson-CSF (licensee of Nothern, Canada)—nonbroadcast radio equipment
Le Materiel Telephonique (affiliated with ITT, U.S.A.)—exchanges, nonbroadcast radio equipment
Compagnie Generale de Constructions Telephoniques (licensee of ITT, U.S.A.)—exchanges
Societe Telephonique Francaise Ericsson (licensee of Ericsson, Sweden)—exchanges

The Communications Network

The French PTT, through Direction General des Telecommunications (DGT), has a monopoly on the operation and ownership of the telephone system. Other than a limited number of networks operated by the national electric utility and railway, all lines and networks are owned and operated by the PTT. The system includes underground and submarine cables, microwave links, and telephone exchanges. A subauthority of DGT, the DTRI, regulates connections with private telephone and broadcasting links; another authority, the DTRN, operates long distance lines and systems. Research and development in the field of communications is done by the Centre National d'Etudes en Telecommunications.

The French national telephone network has long been an area of major neglect. Although telephone density more than doubled between 1963 and 1973 (23.6 per 100 persons in 1974), and main lines increased over 10% annually in the same period, nearly one tenth of all public exchanges were still manually operated in 1975 and one mililon people were awaiting telephone installation. The long distance system consists of: the original prewar low frequency underground system (16%), new coaxial lines of various capacities (55%), and microwave links (29%). Coaxial lines are presently being installed that offer 2,700 channels per 2 coaxial pairs at 12 MHz, and very shortly 60 MHz pairs will be installed, giving 10,800 channels per twin pair. Parallel to the installation of new coaxial cables, substantial installation of microwave systems has also taken place. By 1985 microwave systems are expected to reach the transmission equivalent of about half the length of long distance lines.

The national communications network consists of 700 regional routing centers joined to 30 interconnected regional transit centers. Congested crossbar exchanges in the interurban network are being progressively replaced by GCI-type exchanges of a standard 10,000 erlang capability.

A number of specialized data transmission systems are being developed by the PTT; the most prominent is the CADUCEE, which transmits at speeds of 2,400, 4,800, or 9,600 bps through the immediate Paris area. Public telex offers transmission at either 50 or 200 baud. The public telephone network, often used for timesharing and data input, has three transmission rates available: 50, 200, or

Abbreviations

CADUCEE	**PTT National Data Transmission System**
CCIR	**Consultative Committee on International Radio**
CCITT	**Consultative Committee on International Telephone and Telegraph**
CEPT	**Conference Europeenne des Administrations des Postes et des Telecommunications (European Conference on the Administration of Posts and Telecommunications)**
CNET	**Centre National d'Etudes de Telecommunications (National Center on the Studies of Telecommunications)**
DGT	**Direction Generale de Telecommunications (General Directorate of Telecommunications)**
DTRI	**Direction des Telecommunications du Reseau International (Directorate of Telecommunications of the International Network)**
DTRN	**Direction des Telecommunications du Reseau National (Directorate of Telecommunications of the National Network)**
EDF	**Electricite de France (French Electric Company)**
GCI	**Grands Centraux Interurbain (Main Interurban Office)**
GDF	**Gaz de France (French Gas Company)**
PTT	**Ministere des Postes et Telecommunications (Minister of the Posts and Telecommunications)**
SNCF	**Society Nationale des Chemins de Fer (National Society of Railways)**
SNIT	**Syndicat National des Installateurs en Telephonie (National Syndicate of Telephone Inductors)**
SOCOTEL	**Societe mixte pour le developpement de la technique de la communication en Telecommunications (Joint Society for the Technical Development of Telecommunications)**
SOTOLEC	**Societe mixte pour le developpement de la technique des Telecommunications sur Cables (Joint Society for the Technical Development of Telecommunications on Cables)**

Table 1.—France: Market for communications equipment, 1972-75, projected 1980[1]

(In millions of U.S. dollars)

	1972	1973	1974	1975	1980
Telephone and telegraph apparatus					
Central office exchanges	341.4	499.8	555.6	611	1,625
Private branch exchanges	95.0	185.2	214.5	256	515
Transmission equipment/ systems	289.3	445.4	598.3	718	2,000
Other	28.7	44.5	66.7	81	175
Data communication equipment	59.6	63.3	67.1	81	200
Nonbroadcast radio and TV communications equipment					
Mobile radio, land	83.6	129.2	138.2	159	370
Mobile radio, marine	11.9	12.1	14.3	16	24
Paging systems	9.9	17.9	21.3	24	40
Other mobile	32.7	47.9	58.9	67	130
Closed circuit TV	5.5	11.7	13.5	15	25
Microwave components[2]	.4	.7	1.0	1	2
Communications test equipment[3]	15.8	26.1	29.9	36	90
Total	973.8	1,483.8	1,779.3	2,065	5,196

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[1] Including overseas territories and departments.

[2] Sold separately.

[3] For other than laboratory use.

Source: Bureau of International Commerce, Office of International Marketing research study; values based on official French statistics and trade source estimates.

600/1200 baud. Leased telegraph and telephone lines are available to provide both low- and high-speed data transmission facilities.

Telex traffic has shown a 20% average annual increase during 1970-74; subscribers numbered some 47,533 at the end of 1974. Approximately 30 post offices have telex facilities for use by the general public. Telegraph traffic has declined since 1970, reflecting the increasing efficiency and use of the telephone system.

The PTT has seven Earth satellite stations in operation, the first in service in 1969 at Plemeur-Bodou. In addition to providing links with North America, the satellites provide telecomunications links with French overseas possessions, principally Guiana and Tahiti. These Earth satellite stations have 5 or 6 channels at the present time, with the ability to extend to 100 in low density and permit 1,000 simultaneous voice conversations.

The PTT and the CNET are developing a number of experimental systems, including: (1) Visiophone/ Visioconference, used for visual conversations, document reading and transmission, video data screen and visioconference, expected to be test-marketed in 1977; (2) Telecopier, recently offered to the public at main post offices; (3) Eurosignal, an automatic system of personal paging which allows telephone subscribers to call any Eurosignal receiver by dialing a 10-diget number, anticipated to be in operation by 1978; and (4) Radiotelephonique Automatique permits "mobiles," to be connected directly with the public telephone network via a radio link. Telephone attachments, such as automatic dialing, automatic recorders, keyboard dials, and integral loud speakers, are now available.

PTT-enforced technical standards generally follow those of the CCITT and CCIR; in some cases they

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Table 2.—France: Imports of communications equipment, 1972-75, projected 1980

(in millions of U.S. dollars)

	1972	1973	1974	1975	1980
Telephone and telegraph apparatus					
Telephone instruments	3.3	3.4	4.9	5.7	14
Teleprinters	5.4	5.3	6.8	8.2	17
Subscriber equipment	1.2	1.4	2.5	3.0	7
Transmission equipment:					
Separate items	.4	.5	.2	.3	1
Other telephone electrical equipment	3.5	7.1	11.6	17.4	78
Other telegraph electrical equipment	1.0	1.6	1.4	1.4	2
Parts and spares—telephones	7.3	11.9	16.2	20.2	69
Parts and spares—telegraph	1.5	1.8	1.3	1.5	2
Low frequency telephone amplifiers	1.3	.8	.5	.5	1
Telegraphic copying equipment	.6	.7	.6	.8	2
Subtotal	25.5	34.5	46.0	59.0	193
Data communications equipment					
Telegraphic tape machines	N/A	.1	—	—	—
Nonbroadcast radio and TV communications equipment					
Base station transmitters	1.4	1.4	1.8	2.0	4
Base station receivers	N/A	2.6	3.1	3.4	7
Vehicle transmitter/receivers	8.3	4.4	5.5	6.1	8
Walkie-talkies	3.0	3.1	4.4	5.1	13
Vehicle aerials	2.2	3.4	3.8	4.1	9
Fixed aerials	2.2	3.2	4.2	5.1	11
Aerial filters and separators	N/A	.2	.3	.3	1
Subtotal	17.1	18.3	23.1	26.1	53
Components (including microwave design)					
Transistors	26.6	43.2	61.8	—	—
Other semiconductors	25.6	46.2	50.3	—	—
Diodes	12.8	19.2	29.4	—	—
Integrated circuits	16.0	33.6	60.4	—	—
Hybrid integrated circuits	2.4	10.5	17.4	3.0[1]	6
Other modular circuits	1.0	2.2	4.1	—	—
Microwave tubes	N/A	2.3	1.9	—	—
Subtotal	84.4	157.2	225.3	3.0	6
Test equipment (including communications test					
Specialist telecommunications test	1.1	.6	1.6	2.0	7
Oscilloscopes/graphs	9.9	15.1	15.8	—	—
Multimeters	—	1.0	1.3	—	—
Voltmeters	—	2.3	3.6	—	—
Wattmeters	—	.2	.3	—	—
Frequency meters	—	1.1	1.2	5.2	10
Phasemeters	—	.1	—	—	—
Fieldmeters	—	.1	.4	—	—
Impedance meters	—	.2	.1	—	—
Other meters	—	.1	.4	—	—
Subtotal	10.0	22.7	27.7	7.2	17
Total, all equipment	137.0	232.8	322.1	95.3	269

[1] For microwave components only.

[2] Proportion for telecommunications equipment in use.

Source: Bureau of International Commerce, Office of International Marketing research study; values based on official French statistics and trade source estimates.

are more stringent than these. Only in September 1975 did formal documentation become available regarding PTT requirements for telephone equipment.[2] Formal documentation is not available concerning telex, telegraph, and data transmission equipment; however, the following CCITT characteristics are relevant: V21, V23, V24-8 V26, and V27. Even when approval has been given, telephone and telegraphic equipment can be installed only by an approved member of SNIT.

Major Purchasers

Government.—The Federal Government, through the PTT, plans to improve the quality of communications services offered to the public by fully automating the telephone system by 1979 and increasing telephone density to 36 per 100 inhabitants by 1982. Three-fourths of telephone and telegraph equipment sales in France are now made to the PTT (see table 4), and trade sources foresee PTT data transmission networks taking an even larger share of this market in the future. Planned investment will equip half of the long distance lines with microwave links by 1980.

Funding for the PTT comes primarily from the Government, but private financial groups are increasingly involved through long-term loans. Local and municipal authorities in France have no influence on PTT investment programs, nor do they fund or manage any major communications program of their own. These bodies are unable to circumvent the PTT in purchasing communications equipment.

Retail and manufacturing.—Investment in communications equipment by the retail, hotel, and manufacturing industries is in direct relation to general economic conditions in France. A steady de-

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[2] "Instruction Generale sur la service de Telecommunications" FASCICULE TC1—"Installations Telephoniques d'Abbonees reliees au reseau telephonique general" is available from: Direction General des Telecommunications, Service Documentation—Piece 501, 30 Boulevard de Vaugirard, Paris 15e.

Table 3.—France: Imports of communications equipment by country of origin, 1974

(in thousands of U.S. dollars)

	Total	United States	Germany	United Kingdom	Netherlands	Italy	Other
Telephone and telegraph apparatus							
Telephone instruments	4,937	1,386	966	1,388	—	—	1,197
Teleprinters	6,789	4,189	461	1,276	—	488	375
Subscriber equipment	2,502	280	418	—	—	—	1,804
Transmission equipment:							
Separate items	249	—	105	—	—	—	144
Other telephone electrical equipment	11,584	845	4,891	—	—	1,358	4,490
Other telegraph electrical equipment	1,362	360	370	520	—	—	112
Parts and spares—telephone	16,154	1,062	1,655	618	—	—	12,819
Parts and spares—telegraph	1,311	481	500	134	—	—	196
Low frequency amplifiers	465	—	181	—	—	—	284
Telegraphic copying equipment	644	—	227	242	—	—	175
Data Communications equipment							
Telegraphic tape machines	20	—	—	—	—	—	20
Nonbroadcast radio and TV communications equipment							
Base station transmitters	1,785	44	444	—	—	262	1,035
Base station receivers	3,104	934	443	71	—	—	1,656
Vehicle transmitter/receivers	5,467	43	2,920	585	791	—	1,128
Walkie-talkies	4,386	115	—	—	—	—	4,271
Vehicle aerials	3,819	—	1,164	—	—	600	2,055
Fixed aerials	4,247	844	1,766	476	—	242	919
Aerial filters and separators	260	68	—	64	—	—	128
Components (including microwave design)							
Transistors	61,769	31,791	7,219	—	7,022	6,206	9,531
Other semiconductors	50,267	3,030	4,830	3,803	2,293	—	36,311
Diodes	29,536	11,021	11,391	1,662	2,116	2,408	938
Integrated circuits	60,504	32,187	4,879	—	2,606	—	20,832
Hybrid integrated circuits	17,414	15,882	200	132	—	—	1,200
Other modular circuits	4,087	2,054	1,110	288	176	340	119
Microwave tubes	1,896	655	46	915	178	—	102
Test equipment (including communications test)							
Specialist telecommunications test	1,564	93	1,266	58	—	—	147
Oscilloscopes/graphs	15,783	5,551	1,715	1,699	6,422	—	396
Multimeters	1,335	415	217	293	211	162	37
Voltmeters	3,587	2,494	581	444	—	—	68
Wattmeters	297	95	166	—	—	—	36
Frequency meters	1,178	568	404	95	—	—	111
Phasemeters	41	—	—	—	—	—	41
Field meters	250	59	103	—	—	—	88
Impedance meters	140	121	—	—	—	—	19
Other meters	3,367	1,268	1,159	156	278	—	506
Total	322.100	117,935	51,797	14,919	22,093	12,066	103,290

Source: Bureau of International Commerce, Office of International Marketing research study; values based on official French statistics and trade source estimates.

mand for communications equipment is expected, since both the retail and manufacturing sectors are presently underequipped. Modernization of PBX equipment is planned in the hotel field where mergers and equipment updating are anticipated. Continuing expansion of hypermarkets (very large, single-story, self-service stores), supermarkets, department, and variety stores offer a significant potential for communications equipment sales. In 1974 French chain stores accounted for some 23% of total retail turnover. They are a prime prospect for management information systems, usually "point of sale" devices.

Transportation.—The nationalized railways were budgeted to invest $690 million in development programs in both 1975 and 1976. The SNCF's (the national railway) extensive communications network encompasses all types of telephone, telegraph, and radio equipment including microwave transmission. Under French law, the railways are permitted their

Table 4.—France: Projected sales distribution of communications equipment by end users, 1980

(percent)

	Military	Federal[2]	Local	Municipal	Manufacturing	Retail	Banking & Ins.	Transportation[3]	Public utilities	Hospitals	Education	Mining & minerals explor.	Other
Telephone and telegraph apparatus													
Central office exchanges	—	100	—	—	—	—	—	—	—	—	—	—	—
Private branch exchanges	2	—	4	4	28	30	6	8	3	2	2	2	9
Transmission equipment/systems	1	87	—	—	2	3	1	2	1	—	—	—	3
Other[4]	—	5	12	12	20	14	8	16	2	2	2	2	5
Data Communications equipment	1	83	—	—	2	1	1	10	2	—	—	—	—
Nonbroadcast radio and TV communications equipment													
Mobile radio, land	25	5	5	5	5	—	—	30	5	5	—	—	15
Mobile radio, marine	45	—	4	4	—	—	—	30	—	—	—	—	17
Paging systems	—	60	2	2	10	10	4	4	4	1	—	1	2
Other mobile radio[5]	20	—	—	—	40	—	—	10	20	—	—	—	10
Closed circuit TV	2	10	10	35	10	—	—	15	2	6	6	2	2
Microwave components[6]	2	3	—	—	94	—	—	—	—	—	—	—	1
Communication test equipment[7]	9	65	—	—	4	—	1	10	4	—	1	1	5
Total	3	70	1	1	6	5	1	5	2	1	1	—	4

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[1] Figures represent sales to each end-user market segment as a percent of total sales of each type of equipment listed.

[2] Data for the PTT are included here.

[3] Includes rail, marine (cargo and recreational), trucking, taxis, etc. Air transport services excluded.

[4] Central office equipment n.e.s. and subscriber/user premise equipment.

[5] Excludes all air mobile nonbroadcast communications equipment.

[6] Sold separately.

[7] For other than laboratory use.

Source: Bureau of International Commerce, Office of International Marketing research study; values based on official French statistics and trade source estimates.

own communications lines, independent of the PTT. Current plans call for equipping all Paris Metro buses with radios.

Public utilities.—The electricity and gas companies (EDF and GDF respectively) combine their operations at the distribution level. They use an extensive range of communications equipment, including 2,300 PABX's (mainly the crossbar type) with more than 150,000 extensions. Direct dialing is possible from Paris, Orleans, Lyon, Marseilles, and Toulouse. The utilities' telegraph system includes automatic message switching and storing, which is being updated to provide an automatic multiple addressing facility with some 336 teleprinters, later to be expanded to 2,000.

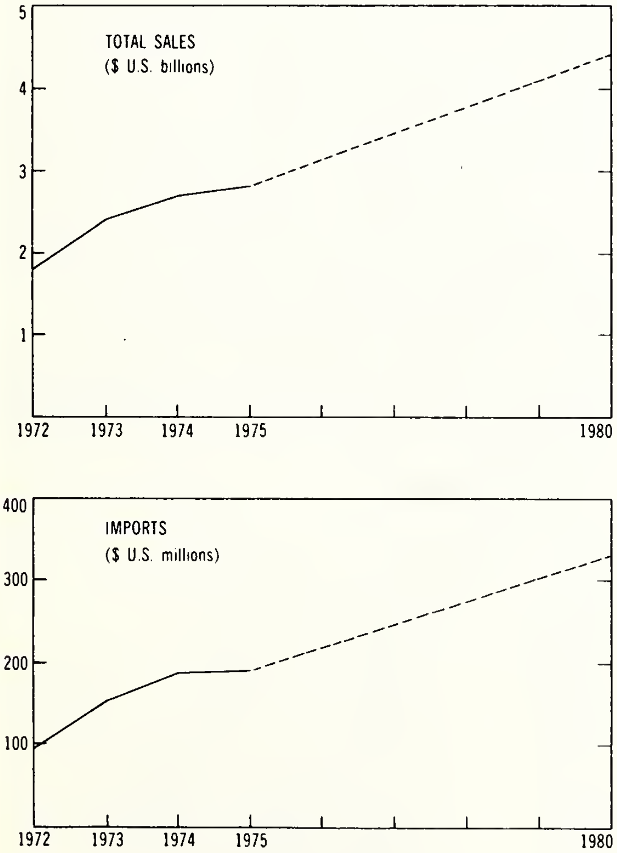
The utilities are increasing their use of data transmission systems over both their own private and PTT leased lines, using speeds from 9,600 to 24,000 bps. Eight hundred modems are estimated to be in use in 1977—twice the 1975 number. Modems with 9,600 bps capacity are imported from the United States because of local unavailability. In southern France and in some areas of Paris, two separate networks have been installed for conversational mode operation with video terminals at sales counters to assist in customer service. Radio and paging systems are used in large generating stations and in administrattive offices of the utilities. Closed circuit TV is commonly used for security purposes at nuclear power stations.

Banking.—French banks have an extensive communications network using a substantial number of private and leased lines. Representative of the banking sector is the nationalized Banque National de Paris (BNP), a major bank with more than 2,000 branches. BNP's domestic telephone system consists primarily of standard PTT subscriber lines with a limited number of leased lines connecting regional centers. The 350 crossbar PABX's in the system undergo periodic replacement. The bank's Paris network is fully automated, with the three primary establishments connected by leased lines which permit direct dialing to other locations. Telex is used extensively between BNP's five regional centers and Paris and between these centers and their main branches. The company will soon be connected to the private SWIFT system which connects the main European and American banking centers. It is estimated that by 1977 this system will carry more than 30,000 messages daily. In mid-1975, the BNP began testing their proposed BETINA system, the forerunner of a domestic system connecting major bank branches to a centralized computer network. The system uses a normal transmission rate of 2,400 baud, which is doubled when concentrators are employed. The development of the BETINA system is regarded as essential to the function of BNP; it is fully funded by the bank and is expected to move ahead regardless of economic circumstances.

Germany

Germany is undergoing a thorough expansion of its communications system—telephone density, already among the highest in the world, will be doubled by 1985; rising use of computers will bring a 30% annual increase in data transmission during the same period; and the Post Office (the Bundepost) hopes to eventually replace most written messages with electronically-transmitted ones. Sales of communications equipment, standing at nearly $2.8 billion[1] in 1975, should reach $4.4 billion in 1980. (See figure and table 1.) By far the most important purchaser in this market is the Bundepost, which controls almost all communications in the country.

Germany: Communications equipment market 1972-75, projected 1980



Source: Bureau of International Commerce, Office of International Marketing research study; values based on official German statistics and trade source estimates.

U.S. Sales Outlook

Imports grew from 5% to 7% of the total German communications equipment market in 1972-74. (See table 2.) The United States is the most importaint foreign supplier-country; imports from U.S. manufacturers grew from $18 million in 1972 to $38 million or 20% of foreign-made equipment in 1975. Trade sources emphasize that American communications products are inadequately known in Germany and that their share of the market could grow with greater exposure.

Important markets for U.S. suppliers of communications equipment are these:

Data communications equipment.—Sales of small and medium sized computers are growing in Germany, as well as intelligent terminals connected to central processors or networks. The data communications equipment market is projected to rise sharply, averaging 38% annual growth from 1974 to 1980, when it should reach $280 million.

Technology in the field emphasizes higher bit rates and automatic equalization. Concentrators increasingly use magnetic tape, primarily in the form of cassettes. Plug-in elements rather than individual chips are also making rapid headway.

Bundepost regulations pertaining to data transmission equipment are somewhat restrictive. Since 1974, modems with speeds up to 2,400 bits per sec-

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[1] All values are shown in U.S. dollars. Local currency data are converted at the following exchange rates: US$1 = DM 3.19 (1972), DM 2.67 (1973), and DM 2.51 (1974 and subsequent years).

Selected Indicators—Germany

Population (1975):	61.8 million
Gross national product (1975):	$380 billion
Installed telephones:	12,446,000
Number of main stations/$100,000 GNP (1974):	0.314
Number of computers (1975):	55,000
Number of data transmitters (1974):	23,500
Number of telex subscribers (1974):	104,000

ond (bps) must be supplied by the Bundepost; from 1979 onwards, the Bundepost will offer modems with speeds of 4,800 and 9,600 bps for lease. Systems connected behind the modems on the subscriber's side must meet Bundepost specifications. Acoustic couplers are not permitted except under 3-month license.

U.S. sales of data communications equipment reached $5.2 million in 1974, accounting for over half of imports. The U.S. share of modems sales in 1975 was 5% for units up to 2,400 bps; 100% for 4,800 bps units with automatic equalizations and 20% for manual equalization units; and 80% for 9,600 bps modems. Best sales opportunities for U.S. data communications equipment include:

- Modems for 4,800 and 9,600 bps (QUAM modulation)
- Multiport facilities
- Eye pattern generators
- Biplexers
- Multiplexers (group band)
- Time division multiplexers
- Data concentrators

Microwave components.—Demand for microwave components is expanding with the increased use of microwave systems. Component sales are expected to rise to over $200 million by 1980. Products with the greatest sales potential for U.S. producers are:

- Semiconductor microwave devices
- Microwave tubes
- Parametric amplifiers
- Stripline microcircuits
- Multiplexers for microwave components and mixers
- Ferrite devices
- Chip capacitors
- Switches
- Other microwave hardware, such as dummy loads, attenuators, connectors, rotary joints, power limiters, phase shifters, and modulators

U.S. sales of microwave components reached $10.4 million in 1974, accounting for 61% of the imports. American firms are expected to retain their strong market position because of their lead in microwave technology. Government purchasing policies and standards do not present a major block to imports of these products.

Subscriber/user premises equipment.—Use of ancillary telephone equipment is increasing in Germany; among these are automatic phone answering units and call recording equipment, automatic abbreviated dialing systems, loudspeakers for conference hookups, intercom equipment and teleprinters, particularly those with built-in modems. The whole market for subscriber premises equipment was quoted at $150 million in 1975, of which imports accounted for $18 million.

Sales of U.S.-made subscriber/user premises equipment stood at $1.5 million in 1975, and future prospects are bright. The government leaves subscribers a relatively free choice in purchasing equipment provided it has been approved by the Central Telecommunications Office. U.S. manufacturers will find especially good sales prospects for teleprinters used as data printers and computer terminals, and facsimile equipment using digital signals.

Mobile radio equipment.—Germany has more than 450,000 public and private mobile radio stations, including 69,500 installed in commercial vehicles, 17,000 used by the government railway systems and 20,000 in ships and marine stations. Most of these installations were set up 5 to 10 years ago. The German government is establishing a public long-distance paging system ("Eurosignal") which will ultimately require about 25 transmitters, of which 7 are now installed; the system's central call stations are designed to have a capacity of 70,000 subscribers. About 65% of the country is now served by Eurosignal, and 95% should be covered by 1985.

The total German mobile radio equipment market was valued at $70 million 1974 and should increase to $185 million by 1980. U.S. sales amounted to $2.2 million, or 10% of the import market in 1974.

U.S. manufacturers will find their best sales op-

Abbreviations

C	Coulomb
CCIR	Consultative Committee International Radio
CCITT	Consultative Committee on International Telephone and Telegraph
CEPT	Conference of European Postal and Telecommunications Administrations
FZD	Fermeldetechnisches Zentralamt der Deutschen Bundepost (Central Telecommunications Office)
UIT	International Telecommunications Union

Table 1.—Germany: Market for communications equipment, 1972-75, projected 1980

(millions of U.S. dollars)

	1972	1973	1974	1975	1980
Telephone and telegraph apparatus					
Central office exchanges..	400	525	535	520	835
Private branch exchanges	85	110	135	140	235
Transmission equipment/systems	1,045	1,355	1,480	1,505	2,135
Other [1]	165	205	230	340	340
Data communications equipment	15	30	40	55	280
Nonbroadcast radio and communications equipment					
Mobile radio, land [2]	25	35	45	65	140
Mobile radio, marine [2]	5	5	10	10	15
Paging systems	5	10	10	10	20
Other mobile	2	5	5	5	10
Closed circuit TV	28	45	60	65	110
Microwave components [3]	40	60	85	105	210
Communications test equipment [4]	30	40	45	50	90
Total	1,845	2,425	2,680	2,770	4,420

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[1] Central office equipment n.e.s. and subscriber/user premises equipment.

[2] Includes stationary equipment for mobile systems.

[3] Sold separately.

[4] For other than laboratory use.

Source: Federal Statistical Office, and trade source estimates.

portunities for computerized paging systems for interpolice communication of the Martin-Marietta type and miniature paging equipment. All radio equipment must be approved by the FZD, which uses CCIR standards.

Satellite transmission system.—Satellite transmission equipment sales were estimated at $20 million in 1975. Germany now has two ground stations employing both frequency multiplex types and cryogenic amplifiers. France and Germany are cooperating on a system that will go into commercial operation sometime in 1977-78. Orbiting satellites for marine communications are planned to go into operation around 1980.

The U.S. position in this market is strong—sales were estimated at $3 million or 60% of imports in 1975. The equipment likely to be in most demand from U.S. suppliers during 1976-80 includes:

- Microwave parabolic antennae
- Log periodic antennae
- Waveguides and assemblies
- Millimeter waveguides
- Low-noise amplifiers
- Tracking control systems

U.S.-made antennas are normally sought for their technological superiority. U.S. firms are by far the most important suppliers of semirigid and flexible waveguides and assemblies, and have no serious competition for sales of high performance low-noise amplifiers.

Closed circuit TV systems.—Sales of closed circuit TV equipment are expected to reach $110 million a year by 1980; imports are forecast to rise by more than 12% to $34 million. U.S. sales approached $2 million in 1974, accounting for 11% of imports. American firms enjoy good prospects in the following areas:

- Monitors
- Receivers
- Cross point equipment
- Recorders
- High-quality cameras

Approximately 12,000 larger permanent closed circuit TV installations are used in educational facilities, department stores, traffic control centers, and industrial installations. High-quality systems with good reproduction, frequently in color, are used for educational purposes while simple, inexpensive black and white sets are used for traffic control, production monitoring, security scanning and the like. U.S. equipment is preferred for the high-quality systems; Japanese firms dominate the market for inexpensive cameras and systems. Cable TV for large residential areas is in the developmental stage in being installed. Analysts expect a total investment of Germany, with one system operational and two $10 billion to establish cable TV systems for the major population centers.

Communications test equipment.—The test equipment market is expected to reach $90 million by 1980. United States manufacturers supply over half the imports of this equipment; their sales stood at over $10 million in 1974. Products with good sales potential for U.S. firms include the following:

- Microwave link analyzer systems
- Up- and down-converters
- Selective level meters for carrier equipment tests, channel noise
- Antenna pattern measuring instruments
- Transmission test instruments
- Wavemeters
- Telephone test sets
- Bit and block error rate measuring systems
- Analyzers (wave, delay distortion, spectrum)
- Generators (random pattern, sweep, signed)
- Pulse generators (synthesizer type)
- High-performance precision digital instruments for mV, mA, R, C, L for testing components
- Automatic (computer controlled) testers for assemblies and printed circuit boards

Competition to American companies in the import market is fragmented and comes largely from

Table 2.—Germany: Imports of communications equipment, 1972-75, projected 1980 [1]

(in millions of U.S. dollars)

	1972	1973	1974	1975	1980
Telephone and telegraph apparatus					
Central office exchanges	13.8	21.3	28.3	26.5	38
Private branch exchanges	11.2	18.2	23.4	23.8	41
Transmission equipment	12.3	21.3	25.8	24.9	42
Other [2]	11.4	18.3	24.0	22.2	39
Total	48.7	79.1	101.5	97.4	160
Data communications equipment	6.8	9.1	10.2	13.4	34
Nonbroadcast radio and TV					
Mobile radio, land	8.1	13.3	18.1	18.3	30
Mobile radio, marine	1.1	2.0	2.5	2.9	5
Paging systems	0.8	1.4	1.5	1.5	3
Other mobile	0.5	0.6	0.8	0.8	1
CCTV	9.8	15.7	17.2	18.4	34
Total	20.3	33.0	40.1	41.9	73
Microwave components [3]	8.6	14.4	16.8	18.0	31
Communications test equipment [4]	10.3	15.8	18.5	18.5	32
Total	94.7	151.4	187.1	189.2	330

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[1] Imports of equipment for defense, navigation, and radar control are excluded. Values are for delivery c.i.f. port of importation.

[2] Central office equipment n.e.s. and subscriber/user premises equipment.

[3] Sold separately to manufacturers.

[4] For other than laboarotry use.

Source: Federal Statistical Office, and trade source estimates.

European subsidiaries of Siemens A.G., N.V. Philips' Gloeilampenfabrienken, and several American firms; many of these are located in Belgium, making that country the second most important foreign suppliers of the German market, after the United States. (See table 3.) Import duties on U.S. goods range from 6.5% to 14%; manufacturers from European Economic Community members enjoy somewhat lower rates but this presents no real obstacle to sales of advanced equipment. Japanese firms have made important market penetrations in sales of parts, subsystems and CCTV through aggressive promotional practices and generally lower prices.

The domestic equipment industry.—The German communications equipment manufacturing industry had 80 firms with 95,000 employees and output exceeding $3.3 billion in 1974; production is expected to approach $5.1 billion annually by 1980. Domestic firms supply more than 90% of the local demand for communications equipment and are able to provide all of the standard equipment for large communications networks such as normal telephone and telegraph systems. The major firms and their chief products are:

Siemens—whole range of communications equipment

AEG-Telefunken—radio, transmission equipment

TE KA DE—transmission equipment, cable, wire (telephone equipment-Philips)

Kabel- und Metall-werke—transmission, cable, wire

Telefonbau und Normalzeit—telephone equipment

DeTeWe Deutsche Telefonwerke—telephone equipment

Krone—telephone equipment

Robert Bosch—radio equipment

Grundig—radio equipment

Wandel & Goltermann—test equipment

SEL Standard Elektrik Lorenz (ITT)—whole range

The Communications Network

All German telecommunications networks, both public and private, are owned or regulated by the Bundepost, giving it an almost all-embracing monopoly in communications. As the country's major purchaser of communications equipment and systems the Bundepost largely determines the nature of the German market (see table 4), and by dictating the parameters of the interfaces and transfer systems that can be used with the public system it also exerts substantial influence on purchasing by the private sector. The FZD establishes technical requirements for telecommunications equipment and observes CCITT standards; national standards also reflect Germany's membership in the CEPT and UIT.

Germany is among the world leaders in communications; in 1974 telephone density was 20 telephone subscribers per 100 inhabitants. The telephone network comprised 12.5 million main subscriber lines distributed over 3,776 local telephone networks served by 5,812 central office exchanges in the same year. An estimated 30% of the lines were taken by business subscribers. Between 1% and 2% of the total 14.5 billion calls were nonvoice connections. A rapidly growing public mobile land radio system (currently with more than 60 transmitters) supplements the wire-borne system and allows direct long-distance dialing from cars and trains. The entire telephone network operates by automatic direct dialing, so few exchanges are manually operated; all calls within the country and nearly 97% of calls outside the country can be dialed direct.

The electromechanical switches now in general use are to be replaced by 1977 with an electronically controlled switch system developed jointly by Siemens A.G., Standard Elektrick Lorenz SEL (a subsidiary of ITT), Deutsche Telefonwerke DeTeWe (an affiliate of Philips of the Netherlands) and Telefonbau und Normalzeit. Trial systems went into oper-

Table 3.—Germany: Imports of communications equipment by country of origin, 1974[1]
(in millions of U.S. dollars)

	Total	USA	Belgium	France	Netherlands	Japan	Other
Telephone and telegraph apparatus							
Central office exchanges	28.3	—	7.3	2.1	3.2	0.6	15.1
PBX, PABX	23.4	0.2	6.0	3.0	2.4	1.2	10.6
Transmission equipment	25.8	1.9	5.2	4.2	4.3	2.4	7.8
Other[2]	24.0	0.9	5.5	4.5	3.2	0.2	9.7
Data communications equipment	10.2	5.2	0.5	1.2	0.8	0.2	2.3
Nonbroadcast radio and TV							
Mobile radio, land	18.1	1.7	3.8	2.6	1.4	3.0	5.6
Mobile radio, marine	2.5	0.2	1.1	0.1	0.4	0.3	0.4
Paging systems	1.5	0.2	0.1	0.1	0.1	0.4	0.6
Other mobile	0.8	0.1	—	0.2	0.1	0.1	0.3
CCTV	17.2	1.9	0.1	1.0	1.2	5.0	8.0
Microwave components[3]	16.8	10.4	0.6	2.5	0.3	1.4	1.6
Communications test equipment[4]	18.5	10.6	0.3	2.4	0.4	0.4	4.4
Total	187.1	33.3	30.5	23.9	17.8	15.2	66.4

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[1] Imports of equipment for defense, navigation, and radar control are excluded. Values are for delivery c.i.f. port of importation.

[2] Central office equipment n.e.s. and subscriber/user premises equipment.

[3] Sold separately to manufacturers.

[4] For other than laboratory use.

Source: Federal Statistical Office, and trade source estimates.

ation in 1974 in Munich and Stuttgart. One computer can cover 300,000 main subscriber lines. Pushbutton telephones have also been recently introduced into the system.

The Bundespost operates a public direct-dial telex system which has become the standard form of communication in most businesses. Telegram services dropped steadily from 16.4 million in 1970 to 10.5 million in 1974. The telex and telegram systems have a low proportion of electronic data communications but both are undergoing modernization. Trials are being conducted with the PCM 30 system for digital transmission.

Transmission of telephone, telex, telegraph and data communications is through low frequency lines on the local level and carrier frequency links for long-distance. At the end of 1974, the Bundepost maintained the following lines:

- Low frequency two wire lines (63 million km)
- Balanced cables for carrier frequencies (1.6 million km)
- Coaxial cables for carrier frequencies (1.7 million km)
- Directional radio carrier frequency links (2.2 million km)

A directional radio link system with 2,700 channels was scheduled for operation in 1976. Future developments include high-performance carrier frequency cables, waveguides and glass fiber transmission. Microwave transmission waveguides are being used experimentally, and satellite systems are being developed for television transmission and international telephone systems.

Major Purchasers

The Bundepost.—The Bundepost employed more than 500,000 persons and had an annual turn over of $10.7 billion in 1974. Total investments amounted to $3.2 billion, including $2.6 billion spent toward telecommunications. Its services cover normal mail services, payment transfers, postal savings (with $10 billion in deposits), the entire telecommunications system, radio and television transmission and bus services.

The Bundepost is engaged in considerable efforts to modernize its services. Work has begun to convert central office telephone exchanges to electronic switching. Three computer-assisted exchange types are planned—local and long-distance electronic exchanges and a switch-through electronic switching system for connecting PCM lines suitable for a future digital transmission system. These systems will facilitate direct communications between local exchange network and offer the customer such innovations as pushbutton dialing, abbreviated dialing of frequently called numbers, automatic switchover to an answering service, fully automatic alarm calls, and facilities for blocking outgoing, self-dialed, long-distance calls. Long-range plans will convert the whole telephone system into a digital network using PCM, although this will not be completed before the turn of the century.

The Bundepost plans to invest $637 million by 1984 to modify its switching system and add new charge registration equipment. In so doing, most local-call areas will be enlarged to a radius of approximately 20 km, and a time limit of 4 to 8 min-

Table 4.—Germany: Projected distribution of communications equipment sales by end users, 1980[1]

(percent)

	Post Office	Government[2]	Manufacturing	Retail	Banking, Insurance	Transportation[3]	Public utilites	Hosptals	Education	Mining & Minerals	Other
Telephone, telegraph apparatus											
Central office exchanges	100	—	—	—	—	—	—	—	—	—	—
PBX, PABX	3	18	30	6	12	5	5	7	5	1	8
Transmission	95	2	1	—	—	—	1	—	—	1	—
Other[4]	90	1	2	—	—	1	1	—	—	—	5
Data communications equipment	56	3	22	4	7	1	1	1	1	1	3
Nonbroadcast radio and TV											
Mobile radio, land	25	20	12	2	2	15	9	4	—	2	9
Mobile radio, marine	10	10	—	—	—	55	—	—	—	—	25
Paging systems	3	5	28	7	5	18	8	12	4	4	6
Other mobile radio[5]	10	40	15	5	—	—	5	5	5	3	12
CCTV	—	15	28	9	5	1	1	7	25	2	7
Microwave components[6]	20	3	75	—	—	—	—	—	1	—	1
Communications test equipment[7]	58	—	32	—	—	—	—	—	5	—	5
Percent of all equipment	78	4	9	1	1	1	1	1	1	1	2

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[1] Figures represent sales to each end-user market segment as a percent of total sales of each type of equipment listed.

[2] Sales for defense are excluded.

[3] Includes rail, marine (cargo and recreational), trucking, taxis, etc. Air transport services excluded.

[5] Excludes all air mobile nonbroadcast communications equipment.

[6] Sold separately.

[7] For other than laboratory use.

Source: Bureau of International Commerce, Office of International Marketing research study; market shares based on Bundespost statistics and trade source estimates.

utes per tariff unit will be introduced for local calls.

Another major Bundepost project is the establishment of a new electronic data transmission system integrating the present telegraph, telex and datex networks with central computers through the public network. The first linesections will undergo trials in 1977. By 1980, roughly 20% of the telex lines and 45% of the datex lines should be connected directly into the new system.

Ultimately the Bundepost plans a changeover of the whole network to PCM, retaining the present carrier frequency cables. Transmission between exchanges to 2,048 bps bundles by PCM methods is also being considered, preferably by asychronous PCM equipment. It is hoped to use the existing cable systems for digital transmission. Germany's future integrated telex and data network will employ data switching stations in its electronic data transmission systems and data conversion stations for time multiplexing systems. Data conversion stations will replace telegraph relay stations.

Other government administration.—Aside from the Bundepost and the Federal Railways, public administration at the federal, state, and local levels employed almost 400,000 persons in 1973, with a budget of $110 billion. Efforts are being made to counteract the present financial difficulties by increasing operating efficiency. Telecommunications are slowly replacing the written word, as more departments are linked to a central telex network. Direct dialing between extensions have been introduced in all areas of public administration.

Special priority has been given to internal security and law enforcement. Police forces are acquiring extensive telecommunications systems for rapid transfer of information. Fire departments and civil defense organizations are now equipped with RT systems, which are continuously being supplemented and modernized.

Manufacturing.—Germany's manufacturing industry includes 54,000 companies of more than 10 employees. Total sales reached $260 billion in 1973. Industrialists have been reluctant to invest over the past few years, but trade experts foresee capital expenditures growing after 1977. Current investment focuses on rationalization, including modern communications systems, so manufacturers' share of the communications equipment market should increase from 4% in 1974 to 9.2% in 1980.

The extremely high cost of labor in Germany has changed the profile of the national industry. Manufacturing is now characterized by numerous mergers among scattered production facilities, making modern communications systems increasingly important. As more German companies become multinationals, they require communications extending even beyond their national borders. More and more intelligent terminals are being installed, and the demand for data communications systems is constantly growing.

Education—There are 29,000 general education schools and 6,000 vocational training centers in Germany. Higher education is conducted in 109 universities and colleges, 147 colleges of technology, and 30 colleges of art. In 1974, of the 479,000 full-time teachers, 65,000 were employed at colleges and universities.

Closed circuit television is used in the educational sector, and there are plans to step up the use of educational TV networks. Universities are being equipped with paging systems, but only slowly because of a shortage of funds. Research institutions with data processing systems must also purchase data communications equipment. Special college faculties concerned with telecommunications, such as post-engineering schools, use communications equipment for instruction purposes. Equipment for such purposes must be of the latest kind, and technical standards and norms present no barriers to its purchase.

Educational institutions also provide a small market for all sizes of PBX equipment.

Additional Information

This Survey is one of a series based on market research reports prepared overseas for the Office of International Marketing. Other detailed marketing information on Germany is available on a continuing basis from:

Country Marketing Manager-Germany
Office of International Marketing
BIC/DIBA
U.S. Department of Commerce
Washington, D.C. 20230

A copy of the original research which this Country Market Survey summarizes is available at a cost of $10 from:

National Technical Information Service
U.S. Department of Commerce
Springfield, Virginia 22161
Sales desk telephone: (703) 557-4650

The report covers: (1) a detailed description of the national telecommunications network, (2) discussion of the market with special sections on products of particular interest to U.S. manufacturers, (3) descriptions of all major end-user sectors, (4) competitive situation, including United States, third-country and domestic suppliers, (5) tariff rates, and (6) lists of potential purchasers, trade associations and publications. Please request: "The Market for Communications Equipment and Systems: Germany." DIB 76-05-504, October 1975.

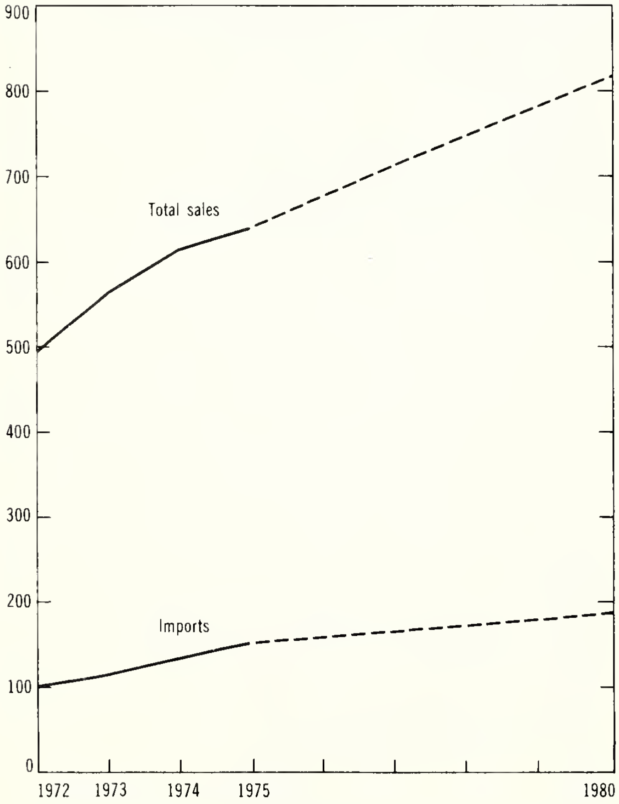
Information on the availability of published standards in Germany may be obtained from the National Technical Information Service, Technical Help to Exporters, Springfield, Virginia 22161.

Italy

Rising numbers of users, the need to replace obsolete equipment and long-range development plans have sustained growth of the Italian market for communications equipment through the recent recession and should continue for the rest of this decade. Sales for 1980 are predicted to exceed $800 [1] million, up from their 1975 level of $642.7 million. (See figure and table 1.)

Italy: Communications equipment market 1972-75, projected 1980

(in millions of U.S. dollars)



Source: Bureau of International Commerce, Office of International Marketing research study; values based on official Italian statistics and trade source estimates.

U.S. Sales Outlook

Imports accounted for nearly one-fourth of the 1974 communications equipment market; 17% of these imports came from the United States. (See tables 2 and 3.) American firms find good markets in all product categories, but most of their sales are of highly sophisticated items for which there is little competition. Best sales opportunities are discussed below:

Transmission equipment and systems. — Sales of transmission equipment and systems account for one-quarter of the Italian communications equipment market. Value of this equipment is expected to rise from $151.6 million in 1974 to $195 million in 1980. Imports accounted for 33% of sales in 1974 and are forecast at 35% or $70 million by 1980. U.S. firms supplied 21% ($11.2 million) of transmission equipment imports in 1974, with particularly strong shares for satellite equipment (47% of imports) and milimeter waveguides (20%). Items with the highest U.S. sales potential during the 1975-80 periods include:

- Parametric amplifiers
- Cryogenic equipment
- Low-noise amplifiers and receivers for satellite transmission
- Millimeter waveguides
- Microwave equipment

Italy's satellite ground stations are built by S.T.S., a consortium including SIT-Siemens, Sirti, and GTE, which incorporate parts, components, and systems from other firms, including many U.S. manufacturers.

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[1] All values are shown in U.S. dollars. Local currency data are converted at the following exchange rates: U.S.$1.00=583 Lit (1972 and 1973) and 661 Lit (1974 and subsequent years).

Italy—Selected Indicators

Population (1975):	**55.8 million**
Gross domestic product (1975):	**$170 billion**
Number of computers (1974):	**4,800**
Installed telephones (1974):	**13,699,742**
Number of main stations (1974):	**70,000**
Number of telex subscribers (1973):	**13,800**

Data communications equipment.—Data communications equipment sales rose rapidly from 1972 to 1975 and growth projections indicate a 10% annual increase in the market through 1980, when it should reach an estimated $15 million. Imports are expected to rise at a slightly faster rate, with U.S. manufacturers maintaining the 29% share ($1.2 million) held in 1974. The bestselling U.S. products include:

- Electronic message switching systems and components
- Modems (2,400 bps and higher)
- Special-purpose multiplexers
- Data concentrators

Spurring the sharp increase in demand for these products is the dramatic upsurge in automatic data processing in Italy; the country's computer population numbered 4,800 units in 1974 and should reach 14,000 by 1980. Message switching equipment accounts for nearly one-third of the imports in this category. The increasing use of computers to perform message switching functions has triggered an increase in the market for electronic switching components and subsystems. Experts project an average annual growth of nearly 14% in imports of switching equipment between 1974 and 1980. Although the greatest demand will be in the public sector, which must buy from approved companies, U.S. manufacturers are expected to supply the more sophisticated components.

Modems with capacities of over 1,200 bits per second (bps) are currently used only in a limited number of specialized applications. Modems imports are expected to gain an average 13.6% annually after 1974, to reach $75,000 in 1980. American manufacturers are the primary suppliers of units that operate at 2,400 bps and above and are presently the only source of 9,600-bps modems.

Virtually no data concentrator packaged systems are available in Italy, although trade sources see great interest among potential consumers. A $2.8 million market for imports alone is anticipated by 1980, with U.S. companies sharing the bulk of sales with German firms.

Subscriber/user premises equipment.—The Italian market for subscriber/user premises equipment has been very active since 1968 for a combination of reasons, including aggressive promotion of available equipment by SIP, the government telephone company, rapid expansion of the telex system, and the introduction of data transmission and other new technologies. Sales totaled $90 million in 1974; imports reached $10 million, including $600,000 from the United States. Products offering the best sales potential to U.S. suppliers over the next 5 years are:

- Display terminals
- Teleprinters with modems.
- Data entry terminals
- Picture phone

Most imported user premises equipment is sold directly to the user. The military is one of the largest customers for U.S. teleprinters and high-speed modems. American-made data entry terminals and key system equipment are preferred for their superior design and operating features, and, in some cases, competitive pricing. Display terminals cannot be leased from SIP, forcing many users to turn to foreign suppliers; among these competitors, U.S. manufacturers offer the widest range of models at reasonable prices.

All subscriber/user equipment must be approved by the Ministry for Post and Telecommunications. However, most of the requirements are internation-

Table 1.—Italy: Market for communications equipment, 1972-75, projected 1980

(in millions of U.S. dollars)

	1972	1973	1974	1975	1980
Telephone and telegraph apparatus					
Central office exchanges ...	35.0	44.8	53.0	58.5	88
Private branch exchanges	5.4	6.0	7.4	8.9	11
Transmission equipment/ systems	130.0	144.0	151.6	160.0	195
Other [1]	210.0	240.0	256.0	264.0	302
Data communications equipment	5.4	6.7	8.5	9.5	15
Nonbroadcast radio and TV communications equipment					
Mobile radio, land	48.0	51.0	55.0	57.0	75
Mobile radio, marine	6.7	7.0	7.8	8.1	11
Paging systems	.6	1.2	1.6	2.0	5
Other mobile	33.5	37.0	41.0	42.0	65
CCTV	7.8	9.2	11.8	12.5	20
Microwave components [2]	9.5	11.0	13.0	14.0	20
Communications test equipment [3]	3.9	4.4	5.2	6.2	10
Total	495.8	562.3	611.9	642.7	817

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[1] Central office equipment n.e.s. and subscriber/user premises equipment.

[2] Sold separately.

[3] For other than laboratory use.

Source: ANIE reports, private organization reports, and trade estimates.

Table 2.—Italy: Imports of communications equipment, 1972-75, projected 1980
(in millions of U.S. dollars)

	1972	1973	1974	1975	1980
Telephone and telegraph apparatus					
Central office exchanges, mechanical and electronic, voice:					
Small (less than 1,000 lines)	1.1	1.8	2.2	2.4	2.6
Medium (1,000-3,000 lines)	.7	1.1	1.3	1.4	1.8
Large (over 3,000 lines)	1.8	2.6	1.7	2.9	7.7
Subtotal	3.6	5.5	6.2	6.7	7.7
Private branch exchanges, mechanical and electronic, voice:					
3-40 line systems	.3	.3	.4	.4	.4
41-80 line systems	.2	.3	.3	.3	.3
81-200 line systems	.4	.4	.5	.5	.5
201-400 line systems	.4	.5	.5	.6	.8
401-900 line systems	.2	.3	.4	.5	.7
Over 900 line systems	.2	.2	.3	.4	.6
Subtotal	1.7	2.0	2.4	2.7	3.3
Transmission equipment/systems:					
Wire and cable	9.0	10.0	13.0	14.0	18.0
Microwave	10.0	12.0	15.5	18.0	24.0
Multiplex	5.0	5.5	6.5	7.0	10.0
Millimeter waveguide	3.0	3.5	5.0	5.5	6.0
Satellite	8.5	9.0	11.5	11.5	12.0
Subtotal	35.5	40.0	51.5	56.0	70.0
Other telephone and telegraph apparatus:					
Central office equipment n.e.s.	12.5	14.0	15.5	18.0	20.5
Subscriber/user premises equipment	8.0	9.0	10.0	11.0	12.5
Subtotal	20.5	23.0	25.5	29.0	33.0
Total	61.3	70.5	85.6	94.4	114.0
Data communications equipment					
Switches	1.0	1.2	1.3	1.4	2.8
Modems:					
50-900 bps	.5	.5	.4	.4	.3
901-1200 bps	.3	.3	.4	.5	.4
1201-9600 bps	.1	.2	.3	.4	.5
Over 9600 bps	—	—	.1	.1	.3
Multiplexers	.1	.1	.2	.3	.3
Data concentrators	.9	1.1	1.4	1.8	2.7
Total	2.9	3.4	4.1	4.9	7.3
Nonbroadcast radio and TV communications equip.					
Mobile radio, land:					
Transmitters (bay station)	6.2	6.9	7.1	7.5	8.5
Receivers, vehicle	1.8	2.0	2.1	2.2	2.8
Receivers, portable	3.0	3.4	3.8	4.2	4.7
Mobile radio, marine:					
Transmitters (bay station)	.9	1.1	1.3	1.4	1.5
Receivers	2.0	2.2	2.2	2.4	2.5
Paging systems	.4	.8	1.0	1.3	2.2
Other mobile equipment	13.0	14.5	16.0	18.0	25.0
CCTV	3.0	3.7	4.3	4.7	6.0
Total	30.0	34.6	37.8	41.7	53.2
Microwave components [1]					
Multiplex varactors	.1	.1	.2	.2	.4
Traveling-wave tubes	.1	.1	.2	.3	.5
Microwave integrated circuits	.2	.4	.5	.7	.8
Other	4.3	4.4	4.7	5.0	6.8
Total	4.7	5.0	5.6	6.2	8.5
Communications test equipment [2]	2.2	2.7	3.3	3.7	5.0
Grand total	101.4	116.2	136.4	150.9	188.0

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[1] Sold separately to manufacturers.

[2] For other than laboratory use.

Source: ISTAT Bulletins; industrial and trade estimates.

Table 3.—Italy: Imports of communications equipment by country of origin, 1974
(in millions of U.S. dollars)

	Total	United States	West Germany	Sweden	Japan	Belgium	Other
Telephone and telegraph apparatus							
Central office exchanges, mechanical and electronic, voice:							
Small (less than 1,000 lines)	2.20	.10	1.10	.70	—	—	.30
Medium (1,000-3,000 lines)	1.30	.10	.60	.40	—	.10	.10
Large (over 3,000 lines)	2.70	—	1.30	.60	—	—	.80
Subtotal	6.20	.20	3.00	1.70	—	.10	1.20
Private branch exchanges, mechanical and electronic voice:							
3-40 line systems	.40	—	.25	—	—	.10	.05
41-80 line systems	.35	—	.20	.10	—	—	.05
81-200 line systems	.45	.05	.20	—	—	—	.20
201-400 line systems	.55	.05	.30	.10	—	—	.10
401-900 line systems	.35	.10	.10	—	—	—	.15
Over 900 line systems	.30	.10	.10	.05	—	—	.05
Subtotal	2.40	.30	1.15	.25	—	.10	.60
Transmission equipment systems:							
Wire and cable	13.00	.80	6.80	2.00	.40	.70	2.30
Microwave	15.50	3.50	5.00	.30	2.30	.20	4.20
Multiplex	6.50	.40	3.30	1.40	—	.20	1.20
Millimeter waveguide	5.00	1.00	.70	.15	.30	.20	2.65
Satellite	11.50	5.50	1.00	.30	.50	.30	3.90
Subtotal	51.50	11.20	16.80	4.15	3.50	1.60	14.25
Other telephone and telegraph apparatus:							
Central office equipment, n.e.s.	15.50	1.00	7.50	4.10	.20	1.45	1.25
Subscriber/user premises equipment	10.00	.60	1.90	1.10	.40	1.70	4.30
Subtotal	25.50	1.60	9.40	5.20	.60	3.15	5.55
Total	85.60	13.30	30.35	11.30	4.10	4.95	1.60
Data communications equipment							
Switches	1.30	.30	.55	.05	.05	—	.35
Modems:							
50-900 bps	.45	.05	.20	—	—	.10	.10
901-1200 bps	.35	.05	.10	—	—	—	.20
1201-9600 bps	.25	.10	.10	—	—	—	.05
Over 9600 bps	.10	.10	—	—	—	—	—
Multiplexers	.25	.20	.05	—	—	—	—
Data concentrators	1.40	.40	.40	—	—	—	.60
Total	4.10	1.20	1.40	.05	.05	.10	1.30
Nonbroadcast radio and TV communications equipment							
Mobile radio, land:							
Transmitters (bay station)	7.10	1.90	1.30	—	.10	—	3.80
Receivers, vehicle	2.10	.60	.25	—	.60	—	.65
Receivers, portable	3.80	1.40	.45	—	1.40	—	.55
Mobile radio, marine:							
Transmitters (bay station)	1.30	.40	.30	.10	.20	—	.30
Receivers	2.20	.30	.20	—	.40	.10	1.20
Paging systems	1.00	.20	.40	—	—	—	.40
Other mobile equipment	16.00	2.30	4.90	.40	2.20	.60	5.60
CCTV	4.30	.25	1.80	—	1.05	.15	1.05
Total	37.80	7.35	9.60	.50	5.95	.85	13.55
Microwave components[1]							
Multiplex varactors	.15	.05	—	—	—	—	.10
Traveling-wave tubes	.20	.10	—	—	—	—	.10
Microwave integrated circuits	.50	.20	—	—	—	—	.30
Other	4.75	1.45	.90	.10	.30	—	2.00
Total	5.60	1.80	.90	.10	.30	—	2.50
Communications test equipment[2]	3.30	.90	1.45	.10	.30	.10	.45
Grand total	136.40	24.55	43.70	12.05	10.70	6.00	39.40

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[1] Sold separately to manufacturers.

[2] For other than laboratory use.

Source: ISTAT Bulletins; Bureau of International Commerce, Office of International Marketing research study.

Table 4.—Italy: Projected distribution of communications equipment sales by end users, 1980[1]

		Government											
	Military	Federal[2]	Regional	Local	Manufacturing	Retail	Banking & Ins.	Transportation[3]	Public utilities	Hospitals	Education	Mining & minerals explor.	Other
Telephone and telegraph apparatus	8	66	4	4	7	—	2	2	1	—	—	—	6
Central office exchanges	3	90	3	4	—	—	—	—	—	—	—	—	—
Private branch exchanges	18	18	4	3	33	—	5	2	2	—	—	1	14
Transmission equipment/systems	14	64	3	3	5	—	1	3	—	—	—	—	7
Other[4]	5	62	5	4	10	1	3	2	2	—	—	—	6
Data communications equipment	6	68	3	2	7	1	3	1	1	—	—	—	8
Nonbroadcast radio and TV communications equipment	18	34	3	4	12	1	2	10	2	—	—	3	11
Mobile radio, land	18	40	2	2	8	—	—	13	1	—	—	2	14
Mobile radio, marine	32	25	10	7	3	—	—	14	1	—	—	1	7
Paging systems	5	50	—	—	25	—	7	8	—	—	—	—	5
Other mobile radio[5]	18	35	5	6	10	2	—	8	3	—	—	4	9
CCTV	9	10	1	1	32	10	20	6	2	2	1	2	4
Microwave components[6]	20	65	—	1	5	—	2	3	—	—	—	—	4
Communications test equipment[7]	28	60	1	2	3	—	1	—	1	—	—	—	4
Total	10	59	3	4	8	—	2	4	1	—	—	1	8

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[1] Figures represent sales to each end-user market segment as a percent of total sales of each type of equipment listed.

[2] Data for the Ministry of Post and Telecommunications are included here.

[3] Includes rail, marine (cargo and recreational), trucking, taxis, etc.

[4] Central office equipment n.e.s. and subscriber/user premise equipment.

[5] Excludes all mobile nonbroadcast communications equipment.

[6] Sold separately.

[7] For other than laboratory use.

Source: Bureau of International Commerce, Office of International Marketing research study; values based on official Italian statistics and trade source estimates.

ally accepted standards, and approval is generally pro forma.

Private branch exchange equipment.—The PBX market in Italy is small ($7.4 million in 1974), largely because the average potential consumer is unaware of the possible benefits. Sales are expected to reach $11 million in 1980, including over $3 million in imports. Demand will to a great extent be stimulated by large corporations. The trend is clearly toward the most advanced electronics equipment and the installation of many medium-size semiperipheral exchanges rather than a single central exchange.

SIP and a few domestic suppliers maintain a virtual monopoly on the PBX market but are themselves excellent customers for parts, components, and subassemblies. U.S. manufacturers supplied parts, subassemblies, and specialty products valued at $300,000 in 1974.

Nonbroadcast radio and TV communications equipment. — Nonbroadcast radio and television products account for one-fifth of the Italian communications equipment market. Sales are projected to rise from $117 million in 1974 to $176 million in 1980. The fastest growth is predicted in the market for paging systems. American manufacturers garnered 19% ($7.4 million) of imports in the whole category in 1974 and led their competitors in both land and marine mobile radio sales with shares of 30% and 20%, respectively. These imports are projected to rise to over $50 million in 1980. Predicted bestselling products for U.S. companies during this period are:

- Signaling systems
- Land mobile transmission equipment
- Pocket portable equipment
- Paging systems
- Patch facilities

When reliable performance is important, U.S. equipment has top priority among Italian end users. Even the comparatively higher cost of American-made pocket paging and signaling equipment deters few buyers. American manufacturers have limited international competition for paging systems and offer good patch facilities. Good sales prospects are anticipated for land mobile radio sets. U.S. manufacturers can compete successfully for orders from the transportation, police (both public and private) and emergency (fire-fighting and ambulance) services.

Growth of the marine mobile radio import market is being slowed by strict technical standards designed to protect the domestic industry. However, the standards for other types of nonbroadcast radio equipment are comparatively tolerant and seldom present obstacles to foreign penetration of the market. In general, Italy subscribes to all the major international technical standards agreements such as CCI and CIRM and allocates bandwidths and frequencies according to the Geneva Convention of ITU.

Abbreviations

ANIE	Associazione Nationale Industrie Elettrotecniche ed Elettroniche (National Association of Electrical Engineering and Electronics)
ASST	Azienda di Stato per i Servizi Telefonici (Governmental Agency for Telephone Services)
CCIR	Consultative Committee on International Radio
CCITT	Consultative Committee on International Telephone and Telegraph
CEI	Comitato Elettrotecnico Italiano (Italian Electrical Engineering Committee)
CENELEC	European Committee for Electrical Standards
CIRM	International Committee for Maritime Radio
DCSTR	Direzione Centrale Servizi Telegrafici e Radioelettrici (Central Department for Telegraph and Radioelectric Servicees)
ENPI	Ente Nazionale Prevenzione Infortuni (National Accident Prevention Coucil)
ESRO	European Satellite Research Organization
IEC	International Electrotechnical Commission
IRICON	International Information Computer Oriented Network
ISO	International Standard Organization
ISPT	Istituto Superiore Poste e Telecomunicazioni (Superior Institute for Post and Telecommunications)
IST	Instituto Superiore Tecnico (Superior Technical Institute)
ISSAT	Instituto Centrale di Statistica (Central Institute of Statistics)
ITU	International Telecommunications Union
SIP	Societa Italiana per l'Esercizio Telefonico (Italian Company for Telephone Service)
UER	European Broadcasting Union
UNI	Ente Nazionale Italiano Unificazione (National Italian Agency for Technical Unification)

Communications test equipment.—Sales of communications test equipment will reach $10 million in 1980, nearly double the 1974 market. Imports are projected to reach $5 million in 1980. U.S. producers controlled 27% of the import market in 1974 with sales of $900,000 and can expect to find future sales among the following:

- Microwave modulators
- Random-pattern generators
- Spectrum analyzers
- Frequency counters
- Field intensity meters
- All types of computerized measurement equipment

Italian users are generally under-equipped in both the number and quality of their test instruments. However, the ongoing modernization of Italy's telecommunications systems, plus increased awareness of cost and performance advantages, is giving impetus to the test equipment market.

Microwave components.—The Italian microwave component market is expected to increase from 1974 sales of $13 million to $20 million in 1980; imports constitute over 40% of the market. U.S. manufacturers are the undisputed leaders in the microwave field—their $1.8 million sales in 1974 accounted for one-third of all imports.

All types of American-made microwave components are in demand, especially IMPATT and GUNN diodes, for which they have no competition. American microwave components are frequently purchased for military and satellite communications use.

Italian customers are heavily influenced by price, particularly the initial cost. The lower customs duties imposed on goods from European Economic Community (EEC) and other countries enjoying preferred tariff status benefit companies like Siemens (Germany), Philips (the Netherlands), and Ericsson (Sweden). Japanese firms, noted for their low prices, are handicapped in Italy by severe, restrictive import regulations.

Italian technical standards generally correspond to U.S. Underwriters' Laboratory requirements; when special features are requested, U.S. military specifications are often applied.

Domestic Equipment Industry. — In 1974, the Italian communications equipment manufacturing industry, comprising 110 companies and 48,000 employees, produced goods valued at $595.5 million and supplied more than three-fourths of the domestic market; 1980 output is projected at over $800 million. Twenty manufacturers account for over 85% of production; almost all are subsidiaries or licensees of foreign firms. The most significant are:

SIT-Siemens (licensee, Siemens A.G., Germany)—telephone/telegraph apparatus, microwave components, data communications and communications test equipment

Face Standard (subsidiary of ITT, United States)—telephone/telegraph apparatus, microwave components, data communications and communications test equipment

Fatme (subsidiary of Ericsson Group, Sweden)—telephone/telegraph apparatus, data communi-

cations and domestic test equipment
- GTE Telecomunicazioni (subsidiary of GTE Group, United States) — telephone/telegraph apparatus, data communications equipment
- Sirti—special equipment for telecommunications, earth stations and subsystems, installations
- Selenia (licensee of various U.S. and German firms)—microwave links, data terminals, transposers, satellites, and installations
- Telettra—telephone/telegraph appartus
- Sielte (subsidiary of Ericsson Group, Sweden)—installations
- Philips (subsidiary of Philips Group, Netherlands)—telephone/telegraph apparatus, microwave components, mobile radio equipment, data communications equipment
- Marconi Italiana (subsidiary of Marconi Group, United Kingdom,—microwave, data communications, and communications test equipment, mobile radio

The domestic industry is protected to a large extent by the "buy national" policies of many end sers in the public sector. Duties of 6% to 17% nd a value added tax of 12% are levied. Military urchasers require that ample supplies of all possible pare parts be available locally.

Communications systems and equipment manuactured in Italy incorporate significant numbers of imported subassemblies and components, many from he United States, including test instruments used n operational systems, signal receiving kits for arger systems, microwave components, digital elecronic components or small subassemblies, and pecial military medium frequency groups.

The Communications Network

All telecommunications activities in Italy are supervised by the Ministry of Post and Telecommunications through two agencies: ASST,[2] which is responsible for the planning, construction, and operaion of the primary telephone network; and DCSTR, which directly operates the telegraph, phototelegraph, telex, and ship-to-shore communication services.

Several government-controlled common law corporations operate as sole franchisers in specific telecommunication sectors. The Italian Telephone Service, SIP, runs the local telephone services and part of the long-distance operations. ITALCABLE handles all intercontinental public services such as telegraph, telex, telephone, and data transmission. TELESPAZIO operates satellite telecommunications facilities and represents Italy in the international INTELSAT consortium.

The 231 districts in the Italian telephone network covered 8.69 million subscribers in 1974, of which 77% were private users, 21% industrial, and the remainder government and press. Density was an average 25.2 sets per 100 inhabitants in 1975. Direct dialing has been used since 1970 for all domestic and some international communications. Intercontinental calls are handled by ITALCABLE's manually operated central exchange in Rome.

More than 10% of the central office exchanges are manual, and over 75% use electromechanical switching systems, some installed over 20 years ago. The country's most advanced exchanges were installed in Rome, Milan, and Napes between 1971 and 1974. PROTEO, the first fully electronic 500-line exchange, has been installed in Lombardy and similar systems will probably be adopted throughout the telephone network.

Ninety-four microwave beam or repeater stations, each with 960 channels for 2 or 4 beams, are scattered throughout the country. A 2,700-channel, solid-state system has been installed on the main North-Central Italy link, and other similar links are planned. Microwave links are also used for international transit traffic, either alone or in connection with other international signal transmission systems.

Italian telex subscribers can communicate automatically with other local subscribers and with users in 23 European and 35 non-European countries. Another 60 countries are connected by semi-automatic and manual systems. The automatic telegraph network provides services throughout Italy, Europe, and Libya, as well as ship-to-shore. The volume of telegrams initially declined with the rise of the telephone and telex but since 1971 has remained steadily at around 23 million a year.

The most advanced message switching units for telegraph and telex traffic are the CERAM 1 and CERAM 2 systems. These units essentially operate all public international telegraph traffic, each being connected to over 80 domestic and international point-to-point circuits plus some transit traffic circuits. The centers use four large-scale computers working in parallel. Transmission speeds range from 45 to 9,600 baud. The percentage of electronic equipment used for all telex and telegraphic transmission purposes is estimated at 30%.

SIP handles all data transmission except SIP-authorized end-user operations. Three standard services are available from SIP: direct connection with telegraphic circuits, either 120-Hz bandwidth for 50-baud systems, or 480-Hz bandwidth for 50 to 200 baud; connections using switched public circuits (data transmission represents 7% of telephone traffic); and connections on special circuits, modified to handle higher speeds (normal—up to 1,200 bps, or special—up to 9,600 bps). Both point-to-point and multipoint circuits are available. Digital networks are still in the planning stage.

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[2] See list of agency name abbreviations which appears as a special box in this report.

Italy utilizes the Indian Ocean and Atlantic Ocean satellites through its ground stations at Fucino and Pian di Spagna. TELESPAZIO now controls 960 telephone, 600 video, and 960 data transmission channels, including 418 extra-European telephone and data communication circuits. Satellite transmissions are handled by IRICON, a fully automatic, computerized exchange run by ITALCABLE in Rome. TELESPAZIO prefers the wheel-and-track and mirror feed systems in its ground stations. Major technological trends include the adoption of smaller antennae (10-meter diameter maximum) and the SPADE configuration for group band transmission.

All telecommunications equipment sold to the public sector must comply with norms issued by the ISPT, UNI (the Italian equivalent of the ISO), CEI (which operates within the framework of the IEC and CENELEC), and ENPI (concerned with accident prevention). Normally, equipment manufactured according to recommendations of CCITT, ITU, and UER will meet Italian standards. Satellite-related equipment standards are those of ESRO. Private end users need only meet the ENPI regulations, but all devices connected to either private or switched lines must be approved by SIP.

Major Purchasers

Government.—The Italian Government, including the Ministry of Post and Telecommunications, accounts for more than three-fourths of the nation's communications equipment market. (See table 4.) Development plans are usually prepared by ASST and the government corporation directly involved; that is, SIP, ITALCABLE, and TELESPAZIO. ASST plans called for spending $110 million annually, plus another $20 million managed by the Ministry of Post and Telecommunications, during the 1975-77 period. This would finance the addition of 60 MHz transmission capability to existing coaxial cables, increased microwave beams to 1,800 and 1,700 channels, and development of electronic switching in international and transit traffic exchanges.

SIP, with 62,500 workers and a turnover of $1.3 billion in 1973, will invest $3.4 billion from 1975 to 1978. Among the projects with highest priority are improvement of data transmission potential, replacement of obsolete exchanges with electronic types, introduction of timing devices to calculate charges for local calls, and improvement of duplex telephone dialing. Nearly 3 million new subscriber lines are planned for addition to the telephone network, and 18.8 million km of local communication and 6 million km of long-distance lines will be installed.

ITALCABLE, with 30,500 employees and a turnover of $51 million in 1973, has allocated $90 million for the 1975-78 period to expand the IRICON system and to install new cables connecting Italy with Israel and Central America. For the same timespan, STET budgeted $38 million for TELESPAZIO and other franchising companies of its group for a variety of telecommunications projects.

The Italian policy of gradual decentralization of many governmental functions is expected to increase the share of communications equipment purchased by local authorities. Already, municipalities have proven ready to add equipment that other administrative bodies have been slow to acquire. Several municipalities plan to buy mobile VHF transmitter-receiver sets for their police forces; 10,000 sets are expected to be purchased during the 1975-77 period. Other cities are expected to buy at least 3,000

Additional Information

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The report covers: (1) a detailed description of the national telecommunications network, (2) discussion of the market with special sections on products of particular interest to U.S. manufacturers, (3) descriptions of all major end-user sectors, (4) competitive situation, including U.S., third-country and domestic suppliers, (5) tariff rates, and (6) lists of potential purchasers, trade associations and publications.

Please request: "The Market for Communication Equipment and Systems: Italy." DIB 76-05-505, October 1975.

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sets to increase the number of patrol cars equipped with shortwave or VHF radios. The government of Rome plans to spend some $200,000 in 1977 for a complete CCTV system for telecontrol of stations on the new subway line being built. Milan will purchase a similar system in the near future. Milan, Rome, Turin, and Bologna propose to install emergency networks consisting of strategically placed telephones connected directly to the local police.

Manufacturing.—The national manufacturing sector comprises over 220,000 establishments with more than 5.5 million employees; about 7,000 of these companies have more than 100 employees and 900 have more than 500. Production totaled $30.2 billion in 1974.

Manufacturers accounted for 8% of the communications equipment market in 1974 and should hold about that same portion in the future. Most purchases are centered around laborsaving equipment and systems to counter the rising cost of manpower.

Services.—Communications equipment purchases by Italy's service industries accounted for 6% of the market in 1974 and are expected to increase to 7% by 1980, with greatest growth predicted for the transportation sector. This sector, excluding air transport, had a turnover of $5.8 billion and employed over 490,000 people in 1974. Many thousands of companies are active in transportation, but no accurate count is available. Trade sources estimate that some 555 firms employ more than 100 people, including 190 with more than 500 workers. The Government controls 70% of the sector, particularly the railroads and marine cargo transportation. Experimentation with radio telephone on the railways may lead to substantial demand for this equipment. But the largest investment will continue to be for radio and TV equipment; transportation absorbs 10% of the market for these products.

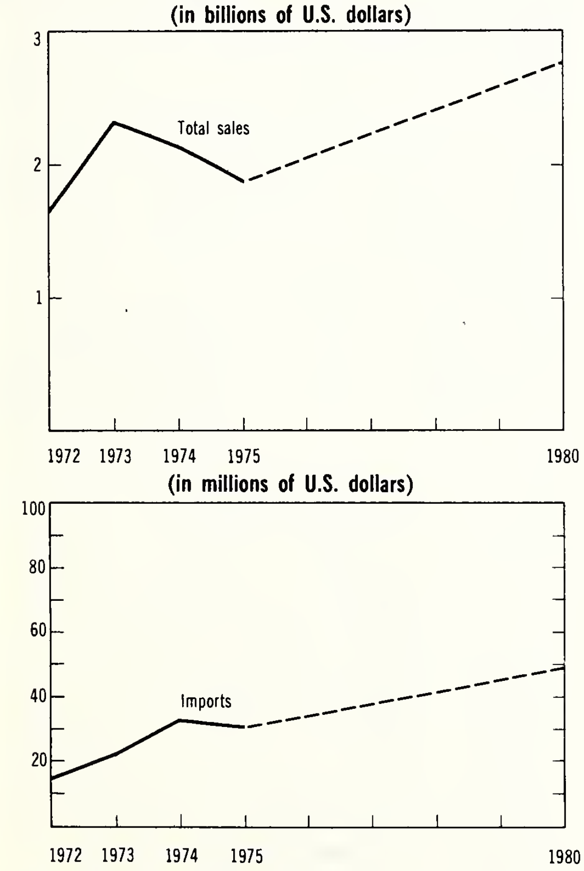
Others. — Italy's 550 financial institutions, with 190,000 employees, had total assets of $124 billion. The 95 insurance companies employed 75,000 workers and had combined premium income of $3.3 billion in 1973. These two kinds of institutions share the same problem: extremely high labor costs and a strong interest in providing the best and speediest service to clients. The trend in this sector is toward more extensive use of communications systems and wider application of highly automated equipment.

The retail sector is expected to increase its purchases of mobile radio, CCTV, and data communications equipment, but its comparative importance in the market will remain limited. Hospitals and educational institutions cannot be counted on as future customers, since they lack funds and comprehensive development plans.

Japan

As Asia's most developed nation, Japan has a continuing need for advanced communications equipment and systems. Despite the world wide recession during the mid-1970s, the Government, which directly or indirectly, accounts for about 75% of this market, plans to steadily invest in its communications network, pushing total sales from $1.9 billion[1] in 1975 to over $2.7 billion in 1980. (See figure and table 1.) The relatively new area of data communications will become an increasingly important factor in this growth; sales of such equipment are predicted to rise as much as 350% to over $100 million during the same period.

Japan: Communications equipment market 1972-75, projected 1980



Source: Bureau of International Commerce, Office of International Marketing research study; values based on official Japanese statistics and trade estimates.

U.S. Sales Outlook

U.S. manufacturers supplied 70% of Japan's 1974 imports of communications equipment, with sales of $23 million in a total import market of $33 million. American firms are expected to increase their share of imports slightly to over $37 million by 1980. (See tables 2 and 3.)

Imports accounted for only 1.5% of the Japanese market for communications equipment in 1974 and are predicted to approach 2% in 1980. Imports represent a low proportion of total sales because of governmental and quasi-governmental agencies' policies to buy domestic equipment. Consequently, the traditional markets for imported equipment are the private sector rather than government. Although small in comparison with Government expenditures, private industry purchases have risen rapidly in recent years.

Products most salable in Japan are those incorporating highly advanced technology, or products which are cost competitive. Credit terms, rental or leasing arrangements, and delivery lead times are of less importance in the purchasing decision than are technological quality and price. Equipment is usually marketed through local agents or distributors. After-sales technical services and a plentiful supply of parts are also important considerations to the Japanese purchaser.

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[1] All values are shown in U.S. dollars. Local currency data are converted at the following exchange rates: US$1 = 308.0 yen (1972); 272.3 (1973); and 300.1 yen (1974 and subsequent years).

Japan—Selected Indicators

Population (1975):	110.9 million
Gross national product (1975):	$447.6 billion
Number of telephone subscriber lines (1975):	28,868,000
Number of main stations (1974):	2,828
Number of telex subscribers (1975):	70,443
Number of computers (1974):	23,443

The outlook is favorable for the following categories of American-manufactured equipment:

Data communications equipment.—Sales of data communications equipment are expected to reach over $100 million in 1980, more than four times their value in 1974. The market is expanding as a result of the diffusion of on-line computer systems. Japan's computer population has grown 35% annually in the past 5 years; its size ranks second in the world, after the United States. Growth in the number of installed computers is predicted to continue through 1980, averaging 25% annually.

Japan's data communications services are controlled by the Government, which restricts purchases to domestic equipment whenever possible. Purchases by private industry are similarly restricted, since all users' equipment connected to public data transmission lines must meet Government technical specifications.

In 1974, U.S. exports of modems were valued at $1.9 million, 100% of Japan's imports of these items. Demand for modems is expected to advance at an average rate of 25% through 1980. Local production has been concentrated on modems of low and intermediate speed which constitute the greatest demand. However, some domestic manufacturers have recently introduced lines of high-speed modems. A digital network for data transmission now in the planning stage is expected to have an adverse effect in the Japanese market for modems. The QAM system of high-speed modems has been introduced through U.S. imports from Codex and the International Communications Corp. It is now being offered by domestic manufacturers instead of the VSB system previously used.

The limited multiplexer market is entirely supplied by U.S. producers. Imports of this equipment are expected to triple during 1975-80 to $3.6 million. Demand for multiplexers is increasing among large entrepreneurs with substantial amounts of data to be transmitted, and among specialized data processing service corporations providing time-sharing services. Local technology in the field lags behind that of the United States and the versatility and reliability of U.S.-origin multiplexers is well known by time-sharing services organizations. Time division multiplexers will continue to account for the largest segment of the market; use of frequncy division multiplexers is limited.

Nonbroadcast radio and TV communications equipment.—Sales of land mobile radios are forecast to reach $82 million in 1980, up 43% from 1975. All imports of this equipment come from the United States. High quality land mobile radio equipment is manufactured locally, but brand loyalty to U.S. products persists in the fields of broadcasting and newspaper publishing. Frequency ranges of 150 MHz to 400 MHz and power ranges of 10 W to 20 W are common for land mobile radios. Both duplex and semiduplex systems are used.

The market for marine mobile radios is expected to grow at an average annual rate of more than 7% through 1980, to reach $53 million in 1980. U.S. imports totaled $1.8 million in 1974 or 35% of total marine radio imports. The Japanese utilize three kinds of marine radio equipment: UHF telephones of 150 MHz for harbor sites, MF equipment for short-distance transmission, and VHF equipment for long-distance transmission. U.S. radio communications equipment has especially favorable market position when they are intended for use in vessels traveling in U.S. waters.

Microwave components.—This market reached nearly $9 million in 1974 and is expected to exceed $12 million by 1980. Imports are expected to rise from 32% of this market in 1974 to over 40% in 1980. U.S.-origin microwave components, with their advanced technology, comprised 95% of Japan's imports in 1974.

Communications test equipment.—Sales of communications test equipment registered $146 million in 1974, and the market is projected to approach $190 million in 1980. Test equipment is expected to be the largest segment of imported communica-

Abbreviations

CCIR	Consultative Committee on International Radio
CCITT	Consultative Committee on International Telephone and Telegraph
GATT	General Agreement on Tariffs and Trade
IFRB	International Frequency Registration Board
KDD	Kokusai Denshin Denwa Co., Ltd.
NTT	Nippon Telegraph and Telephone Public Corporation
QAM	Quadrature Amplitude Modulation
VSB	Vestigial Side Bank

Table 1.—Japan: Market for communications equipment, 1972-75, projected 1980
(in millions of U.S. dollars)

	1972	1973	1974	1975	1980
Telephone and telegraph apparatus					
Central office exchanges	348.6	464.2	390.2	379.4	512
Private branch exchanges	63.4	104.2	75.0	67.5	98
Transmission equipment/systems	721.8	937.5	836.9	708.2	1,000
Other [1]	305.4	496.8	493.0	406.1	593
Data communications equipment	9.7	16.6	23.9	28.8	101
Nonbroadcast radio and TV communications equipment					
Mobile radio, land	44.7	60.6	64.8	56.9	82
Mobile radio, marine	28.9	31.1	34.1	37.4	53
Paging systems	7.9	13.6	12.9	14.5	21
Other mobile radio	17.6	24.0	23.9	29.6	40
Closed circuit TV	13.0	24.0	29.1	32.0	47
Microwave components [2]	6.0	8.2	8.6	8.5	12
Communications test equipment [3]	91.4	147.7	146.3	99.8	189
Total	1,658.4	2,328.5	2,138.7	1,868.7	2,748

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[1] Central office equipment n.e.s.

[2] Sold separately.

[3] For other than laboratory use.

Source: Bureau of International Commerce, Office of International Marketing research study; values based on official Japanese statistics and trade source estimates.

tions equipment by 1980, reaching $15 million. Conventional test equipment is produced locally, but advanced equipment must be imported. U.S.-origin imports reached $10 million in 1974, which is 90% of total communications test equipment imports. American-manufactured products with good sales potential include:

- Spectrum analyzers
- Sweep and signal generators
- Oscilloscopes
- Random-pattern generators
- Error rate test equipment
- Computerized instrumentation

U.S. equipment, primarily in the microwave range, has a favorable sales outlook for use in the following applications:

- Measurement of phase
- Impedance measurement
- Power
- Frequency count
- Noise
- Field intensity
- Antenna patterns

The United States holds the most significant share of Japan's communications equipment imports. British manufacturers sell PBX's, telephone and telegraph apparatus, marine mobile radio equipment, and CCTV to Japan; Italian firms sell transmission equipment and systems; and Norwegian companies PBX's and mobile marine radio.

Customs duties applicable to imported communications equipment range from zero to 20% of an item's value. In general, the lowest available GATT, is applied to imports from member nations. Tariff rates applied to U.S.-origin communications equipment range from 7% to 12% of the cost, insurance, and freight (c.i.f.) value.

Domestic Equipment Industry.—the 1972 Establishment Census of Japan lists 4,270 companies manufacturing communications equipment with a total of 415,000 employees. Production of data communications equipment, non-broadcast radio and TV communications equipment, and communications test equipment reached $364.8 million in 1974, and growth estimates indicate production of $567 million in 1980. This substantial increase is primarily attributable to a 27% average annual growth rate in the production of data communications equipment.

The following Japanese firms produce the bulk of the country's communications equipment:

Anritsu Electric Co., Ltd.—non-broadcast radio and communications test equipment
Japan Radio Co., Ltd.—non-broadcast radio equipment
Nippon Electric Co., Ltd.—data communications and non-broadcast radio equipment
Matsushita Communication Industrial Co., Ltd.—non-broadcast radio equipment, and CCTV
Oki Electric Industry Co., Ltd.—non-broadcast radio and data communications equipment
Fujitsu Ltd.—non-broadcast radio and data communications equipment
Mitsubishi Electric Corp.—non-broadcast radio equipment
Tokyo Shibaura Electric Co., Ltd.—non-broadcast radio and data communications equipment

Kokusai Electric Co., Ltd.—Non-broadcast radio equipment

The import tariff on foreign goods, freight costs and agents' or distributors' commissions push up the price of foreign-made goods vis-a-vis locally manufactured equipment. Superior after-sale services of domestic suppliers also is a strong advantage in marketing local products.

Communications Network

Japan's national and international communications networks are operated on a monopoly basis, with Nippon Telephone and Telegraph Public Corporation (NTT), the only domestic telecommunications carrier, and Kokusai Danshin Denwa Company Ltd. (KDD), the sole international carrier. Telephone density in 1975 was 26.1 subscriber lines per 100 population. Japan is second only to the United States in the total number of telephones in use.

Four-fifths of the central office exchanges utilize crossbar switching and nearly 17% a step-switching system. Electronic switching presently plays a minimal role in the telephone network, although by March 1978, electronically switched lines, currently totaling 300,000, are expected to number 2 million.

In March 1974, 33% of PBX's employed a crossbar switching system, 11% step-switching, and 22% manual-switching. The high costs of electronic-switching are expected to restrict its use in PBX systems for the foreseeable future.

Local telephone networks are wired, while the national long-distance network combine wire, coaxial cable, and microwave systems. Japan's international telephone network includes satellites, submarine cable, troposphere scatter and HF-radio systems. Two earth stations for satellite communications are in operation in Ibaraki and Yamaguchi.

To meet the growing national demand for communications services, the satellite system was expected to be introduced for domestic communications in 1977. Via an experimental satellite, a system using microwaves will encompass the entire Japanese Archipelago, and semimillimeter waves will cover the four main islands.

Since 1966, data transmission has been dominated by PCM 24 (pulse code modulation for 24 channels) technology; PCM 100-M capable of 100 megabits per second (mps) over short distances, was commercially introduced in 1975 on the Tokyo-Yokohama and the Shizuoka-Fujieda-Yaizu lines, and expanded in late 1976. Leased and public communications lines for data transmission totaled 36,159 at the end of March 1975, representing a 37% increase over the previous year.

Utilization of PCM 400-M, capable of 400 mbs, is planned for medium- and long-distance transmission in the late 1970's. Limitation of the PCM network to major cities is anticipated. Installation of a digital data exchange network combining both digital and analog transmission is expected to be started in late 1977 and computed in 1980.

As with telephone service, domestic telegraph and

Table 2.—Japan: Imports of communications equipment, 1972-75, projected 1980
(in thousands of U.S. dollars)

	1972	1973	1974	1975	1980
Telephone and telegraph apparatus					
Central office exchanges	—	—	—	—	—
Private branch exchanges	847.4	187.3	496.5	419.9	543
Transmission equipment/systems	1,909.1	3,305.2	5,021.7	5,948.0	9,870
Others [1]	1,678.6	2,372.4	4,448.5	2,805.7	5,069
Subtotal	4,435.1	5,864.9	9,966.7	9,173.6	14,482
Data communications equipment					
Modems: 1201-9600 bps	—	224.0	1,866.0	2,962.3	3,092
Multiplexers	—	183.6	659.8	1,229.6	3,636
Subtotal	—	407.6	2,525.8	4,191.9	6,728
Nonbroadcast radio and TV communications equipment					
Mobile radio, land	438.3	495.8	399.9	373.2	533
Mobile radio, marine	1,987.0	2,805.7	5,141.6	5,288.2	7,151
Closed circuit TV	97.4	341.5	486.5	329.9	607
Subtotal	2,522.7	3,643.0	6,028.0	5,991.3	8,291
Microwave components [2]	2,165.6	3,040.8	3,122.3	3,315.6	4,965
Communications test equipment [3]	5,422.1	9,485.9	11,099.6	8,040.7	14,872
Total	14,545.5	22,442.2	32,742.4	30,713.1	49,338

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[1] Central office equipment n.e.s and subscriber/user premises equipment.

[2] Sold separately.

[3] For other than laboratory use.

Source: Bureau of International Commerce, Office of International Marketing research study; values based on official Japanese statistics and trade source estimates.

Table 3.—Japan: Imports of communications equipment by country of origin, 1974

(in thousands of U.S. dollars)

	Total	United States	United Kingdom	Italy	Norway	Taiwan	Germany	Sweden	Other
Telephone and telegraph apparatus									
Private branch exchanges	496.5	219.9	30.0	—	76.6	—	—	156.6	13.4
Transmission equipment/systems	5,021.7	2,702.4	—	1,666.1	—	—	60.0	—	593.2
Other [1]	4,448.5	2,229.3	796.6	—	—	669.8	176.6	—	576.2
Subtotal	9,966.7	5,151.6	826.6	1,666.1	76.6	669.8	236.6	156.6	1,182.8
Data communications equipment									
Modems: 1201-9600 bps	1,866.0	1,866.0	—	—	—	—	—	—	—
Multiplexers	659.8	659.8	—	—	—	—	—	—	—
Subtotal	2,525.8	2,525.8	—	—	—	—	—	—	—
Nonbroadcast radio and TV communications equipment									
Mobile radio, land	399.9	399.9	—	—	—	—	—	—	—
Mobile radio, marine	5,141.6	1,806.1	789.7	—	713.1	—	—	316.6	1,516.1
Closed circuit TV	486.5	199.9	143.3	—	—	—	76.6	16.7	50.0
Subtotal	6,028.0	2,405.9	933.0	—	713.1	—	76.6	333.3	1,566.1
Microwave components [2]	3,122.3	2,966.2	—	—	—	—	—	—	156.1
Communications test equipment [3]	11,099.6	9,940.7	237.9	—	—	—	332.9	82.0	506.1
Total	32,742.4	22,990.2	1,997.5	1,666.1	789.7	669.8	646.1	571.9	3,411.1

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[1] Central office equipment n.e.s and subscriber/user premises equipment.

[2] Sold separately.

[3] For other than laboratory use.

Source: Bureau of International Commerce, Office of International Marketing research study; values based on official Japanese statistics and trade source estimates.

Table 4.—Japan: Projected distribution of communications equipment sales by end users, 1980 [1]

(percent)

	Government											
	Military	Federal [2]	Municipal and local	Manufacturing	Retail	Banking & Ins.	Transportation [3]	Public utilities	Hospitals	Education	Minerals & minerals explor.	Other
Telephone and telegraph apparatus												
Central office exchanges	—	100	—	—	—	—	—	—	—	—	—	—
Private branch exchanges	1	12	6	30	—	8	5	4	2	—	2	30
Transmission equipment/systems	1	88	1	3	—	—	3	3	—	—	—	1
Other [4]	—	58	1	14	1	14	4	2	—	—	—	6
Data communications equipment	2	56	—	14	5	6	—	1	—	—	—	16
Nonbroadcast radio and TV communications equipment												
Mobile radio, land	13	16	9	3	—	—	50	5	—	—	—	4
Mobile radio, marine	4	2	1	—	—	—	11	—	—	—	—	82
Paging systems	—	100	—	—	—	—	—	—	—	—	—	—
Other mobile radio [5]	15	46	12	4	—	—	3	3	—	1	2	14
Closed circuit TV	—	—	—	48	13	1	15	7	5	—	—	11
Microwave components [6]	1	2	—	97	—	—	—	—	—	—	—	—
Communications test equipment [7]	2	12 [8]	—	78	—	—	2	2	—	—	—	4
Total	1	68	1	13	1	4	4	2	—	—	—	6

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[1] Figures represent sales to each end-user market segment as a percent of total sales of each type of equipment listed.

[2] Data for the NTT are included here.

[3] Includes rail, marine (cargo and recreational), trucking, taxis, etc. Air transport services excluded.

[4] Central office equipment n.e.s. and subscriber/user premises equipment.

[5] Excludes all air mobile nonbroadcast communications equipment.

[6] Sold separately.

[7] For other than laboratory use.

[8] Includes local and municipal.

Source: Bureau of International Commerce, Office of International Marketing research study.

telex services are handled by NTT. Domestic telegraph networks consist of 30 central tape relay offices and 700 regional centers. Under these offices, regional telephone and post offices receive and deliver telegrams.

The current telex system is capable of 50-bps transmission with the system under control of on-line computers. For telex transmission purposes, Japan is divided into seven blocks, each having a headquarters office with several support stations directly connected to a subscriber's teleprinter through a dialing system.

International telegraph and telex services, handled by KDD, consist of 62 international telegraph channels including 35 satellite, 14 submarine cable, 11 HF radio, and 2 troposphere scattered wave (UHF) networks. International telex circuits, encompassing exclusive lines, totaled 1,065 at the end of March 1974. Direct dialing is used in approximately 95% of Japan's international telex network.

Affected by the rapid growth of telephone and telex networks, domestic telegram usage has been steadily decreasing since 1963. In contrast, use of international telegrams has recently been increasing, with major usage for business purposes.

The telex network's headquarters, as well as its centralized area offices, utilize crossbar switching. Interconnecting main transmission lines use electronic switching equipment. Telegraph transmission lines between central relay offices and branch offices also utilize electronic switching.

Japanese laws, regulations and technical standards applicable to telecommunications are issued and enforced by the Ministry of Posts and Telecommunications. They are compiled in the following publication: Denki Tsushin Sho-Roppo (Compendium of Telecommunications Laws), published by Hifumi Shobo, 8-10 Nishi-Kanda 3-chome, Chiyoda-ku, Tokyo. Regulations on radio communications are contained in Denpa Sho-Roppo, published by Yuhikaku, 2-17, Kanda Jinbocho, Chiyoda-ku, Tokyo. Japan is an active member of the International Telecommunication Union, and its standards and regulations are based on CCITT, CCIR, and IFRB.

Major Purchasers

Government.—The Japanese Government accounted for 73% of telecommunications equipment ment purchases in 1974; it is projected to continue to be a dominant end user, controlling 70% of the market in 1980. (See table 4.) Nippon Telephone and Telegraph, the Government's principal consumer, is expected to account for 85% of government purchases, and over 60% of the total market.

As the Government's agent for domestic telephone and telegraph services, the NTT develops national plans concerning these services. According to the 5-year plan for 1973-78, the overall telephone density will reach 34 per 100 persons, and residential telephones will reach 76 per 100 households by 1978; the plan also schedules the installation of 3,000 television phones. Funds required for implementing the plan total $25.8 billion. Resources are derived from government appropriations and the sale of bonds. The most significant federal procurements are for telephone and telegraph apparatus and nonbroadcast radio and TV communications equipment. The military, not a major end user, mainly buys mobile radio equipment.

Additional Information

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Information on the availability of published standards in Japan may be obtained from the National Technical Information Service, Technical Help to Exporters, Springfield, Virginia 22161.

Purchasing policies of local and municipal governments are primary independent, and '"buy national" policies are not as stringent as those of NTT and KDD. However, foreign manufacturers without business representation in Japan remain at a disadvantage. Local and municipal government purchases are often coordinated. Suppliers of communications equipment to local and municipal governments must register and request placement on the potential bidders lists.

Manufacturing.—Employing 13.3 million workers in over 793,000 companies, manufacturing accounted for $256 million or 12% of sales in the Japanese communications market in 1974. Manufacturers are major consumers of microwave components, data communications equipment (modems and multiplexers), communications test equipment, closed circuit TV, and PBX's. Nearly half of the CCTV equipment sales and 97% of the microwave components sales in 1974 were attributable to this sector, and 1980 predictions project similar proportions.

Transportation.—The transportation sector comprises over 98,000 companies and 2.5 million employees and accounts for sales of nearly $100 million in 1974. Its primary purchases consist of nonbroadcast radio and TV communications equipment, particularly land and marine mobile radio, and CCTV. Half of the land mobile radio sales in 1974 were accounted for by the transportation sector, and forecasts for 1980 anticipate an equivalent share.

Banking and insurance.—Telephone and telegraph apparatus and data communications equipment are major purchases of this sector, which accounted for $85 million of 1974 communications equipment sales. This industry numbers some 62,000 establishments with a total of 1.4 million workers.

Other sectors.—The following end users and their respective communications equipment requirements also offer potential sales opportunities for U.S.-origin products:

Retail	Data communications equipment CCTV
Public utilities	Mobile radio, land CCTV
Hospitals	CCTV
Information services	Data communications equipment
Fisheries	Mobile marine radio

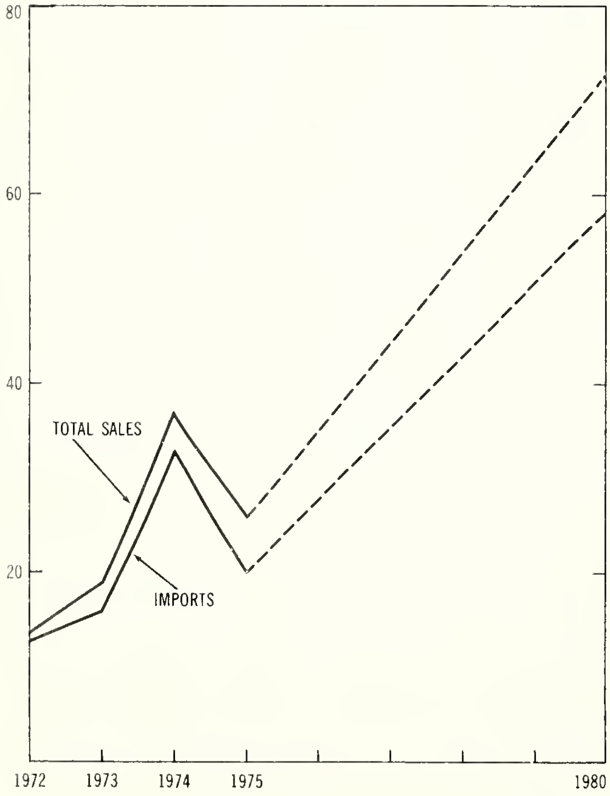
Increasingly these purchasers emphasize the need for advanced technology equipment.

Malaysia

Continuing government efforts to expand and improve the national telecommunications network will boost the Malaysian communications equipment market from $25.7 million[1] in 1975 to $73 million in 1980, representing an average annual growth rate of 23%. (See figure and table 1.) The Malaysian market is tied closely to the Federal Government's current development plan; the Second Malaysia Plan (1970-75) ran embarrasingly short of funds by its final year, bringing communications equipment purchases down somewhat from earlier years. The Third Malaysia Plan allots a more modest and achievable sum of $400 million for work in the communications area, mostly improvements in the telephone system, expansion of transmission capabilities and some introducton of more advanced services as data transmission.

Malaysia: Communications Equipment Market
1972-75, projected 1980

(in millions of U.S. dollars)



Source: Bureau of International Commerce, Office of International Marketing research study; values based on official Malaysian statistics and trade estimates.

U.S. Sales Outlook

Almost the entire Malaysian market for communications equipment is supplied by imported equipment. Sweden and Germany are the chief competitors. (See tables 2 and 3.) The United Kingdom, Japan, the Netherlands and the People's Republic of China (for wire and cable only) are also important.

Sales from the United States have not been great; of total $32.5 million equipment imported in 1974, U.S. firms supplied $1.5 million. American penetration has been strongest in the market for telephone and telegraph parts and components, which is largely purchased by the country's small private manufacturing sector.

There is no reason that American manufacturers could not take a larger share of this growing market. The Malaysian government, which is the country's principal buyer, makes purchases through international tender; local suppliers are as yet too undeveloped to offer competition. Price is always the prime consideration, outweighing all other factors. U.S.-made equipment is generally thought to be expensive relative to other makes, but is still largely untested in the market. The government will be placing several large orders in the next few years, and American

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[1] All values are shown in U.S. dollars. Local currency data are converted at the following exchange rates: US$1 = M$2.81 (1972); M$2.48 (1973); and M$2.35 (1974 and subsequent years).

Selected Indicators—Malaysia

Population (1975):	**12,366,000**
• (Peninsular Malaya)	**10,500,000**
GNP at 1970 constant prices (1975):	**$6.9 billion**
Number of telephone exchange lines (1975):	**170,000**
Number of telephone stations (1975):	**266,000**
Number of telephone stations/$100,000 GNP:	**approximately 38.7**
Number of teleprinters (1972):	
• Public service:	**265**
• Rented:	**687**
Number of telex subscribers (1974):	**570**

manufacturers with local representation stand a good chance of getting a share of this business.

Major areas of expansion in the 1975-78 Malaysian Plan communications program and among private buyers are these:

Central office exchanges.—The Third Malaysia Plan calls for the addition of 396,000 exchange lines, all electronic, and the replacement of existing crossbar installations with larger, electronic models. The Government will also purchase some mobile exchanges. Siemens (Germany) will supply the majority of this equipment, as it did for the Second Malaysia Plan, and the rest will come from Ericsson (Sweden) and Plessey (United Kingdom).

Private branch exchange equipment.—The Malaysian market for PBX equipment is presently quite small; total 1975 sales are estimated at only about $5 million. The market is expected to grow rapidly, however, with the increasing sophistication of commercial and manufacturing users, so that sales in 1980 could more than triple the figure of 1975. Equipment comes primarily from Sweden, the Netherlands, Japan and two local assemblying companies —Pernas Plessey (Plessey) and Telecommunications Manufacturers (Ericsson). All PBX equipment used in Malaysia is leased from the Government and must meet official standards.

Transmission equipment.—Transmission is a special problem for Malaysian planners, whose nation is divided between the major, peninsular area and the island territories of Sabah and Sarawak. Under the Second Malaysia Plan, 380,000 circuit miles of microwave transmission were established and the three areas linked by a video-satellite system. The Third Plan will add 542,600 cable pairs to the country's telephone and telegraph system at a cost of $170 million, lay a submarine cable between Peninsular Malaysia, Sabah and Sarawak, and launch a second satellite of 240 domestic and 160 international chanels. The contract for the satellite was won by Nippon Electric of Japan. VHF and UHF systems will continue to replace the older trunk and junction routes, and new microwave, coaxial and pulse code modulation (PCM) systems are being installed, so that all important towns in Peninsular Maylasia will be connected by the end of the plan period. Japanese, British and American companies have traditionally supplied the more advanced transmission equipment used in Malaysia, and local and Chinese manufacturs the wire and cable.

Telex equipment.—The present market in Malaysia for telex is very small, but promised developments could bring considerable growth. In 1974 570 direct telex lines were installed in the country; government studies project demand for service to grow between 30% and 50% annually through 1980. The Third Malaysia Plan calls for expansion of the public telex network by nearly 150,000 subscribers at a cost of $1.5 million. The only purchaser of this equipment is the Government.

Nonbroadcast radio and TV communications equipment.—Sales of radio telegraphic and telephonic equipment, supplied completely by imports, totaled $1.9 million in 1974. Trade sources expect sales to reach $7.5 million in 1980, of which 87% will be imported. Purchases will be made almost entirely by the Government.

Three systems of mobile radio equipment are currently utilized in Malaysia. Business and government officials use a manual mobile radio service through the telephone operator. Taxis, bus companies, airlines and security organizations lease channels, via repeaters, through the Telecommunications Department, and public services lease channels and are issued their own repeaters. No market is foreseen for CCTV systems.

Communications test equipment.—The Malaysian governmnet spent $850,000 on communications test equipment in 1974, and annual expenditures of about the same amount are forecast to continue un-

Table 1.—Malaysia: Sales of communications equipment, 1972-75, projected 1980

(in millions of U.S. dollars)

	1972	1973	1974	1975	1980
Telephone sets	.4	1.1	.9	.5	3.5
Telephone switchboards and exchanges	2.7	5.8	6.0	5.0	17.5
Wire and cable	1.7	1.8	7.7	3.0	6.0
Telegraphic equipment	.1	.2	1.7	.7	1.0
Parts for telegraphic and telephonic equipment	7.6	8.5	19.0	14.5	37.5
Radio telegraphic and telephonic equipment	1.2	2.3	1.9	2.0	7.5
Total	13.7	19.7	37.2	25.7	73.0

Source: Bureau of International Commerce, Office of International Marketing research study; values based on official Malaysian statistics and trade source estimates.

til 1980. As a market for expensive, sophisticated equipment, it is one of the most attractive to American firms. Hewlett-Packard (United States) already a dominant supplier, enjoys a good reputation. Important 1974 purchases included oscilloscopes, oscillators, frequency counters, volt-ohm meters, spectrum analyzers, signal generators and telephone test sets.

Five local companies manufacture communications equipment, all of which are branches of multinational firms; production was valued at $8.2 million in 1975, and projections indicate production of $19.4 million in 1980. About 40% of this production is parts for telephone and telegraph systems, although these are usually assembled from imported components. Exports amounted to about $2 million in 1974, projected to grow to $5 million by 1980.

The Communications Network

All telecommunications in Malaysia are operated or supervised by the federal Ministry of Communications (Jabatan Telikom Malaysia). The nation's telephone system claimed 266,000 instruments using 143,000 lines in 1975; 30,000 applications for installation were pending. About 46% of these exchange lines were used by residential customers. Only 15 of the 303 exchanges have a capacity of over 3,000 lines. The system is concentrated in the state of Salangor, which includes Kuala Lumpur. Government figures show the density of telephones per 1,000 persons rising from 20 in 1972 to 24 in 1975 and project 58 per 1,000 persons in 1980.

The Second Malalysia Plan (1970-75) spent over $210 million to improve the national telecommunications network. Nine exchanges in Peninsular Malaysia were automated, 105,694 lines added (89,000 in Peninsular Malaysia) and 380,000 circuit miles of microwave system installed. Malaysia's first communications satellite was inaugurated to provide telephone, telegraph and video channels between Peninsular and East Malaysia (Sabah and Sarawak).

The telegraph is a fully automatic system for domestic and international messages. Main telegraph offices are linked by a voice frequency telegraph system with smaller offices served by the telephone network. The number of telegraph offices—totaling 409 in 1973—has not been increased significantly since that time.

The telex network has grown from 342 subscribers in 1972 to over 800 in 1975, with a waiting list of 200 in that year. Of these, all but 40 were installed in government offices. The service works through four automated exchanges (two in Peninsular Malaysia and two in East Malaysia) and 40 international links.

Malaysia is a member of the Commonwealth Telecommunication Organization, the International Telecommunication Satellite Organization and the International Telecommunication Union. Regulations are issued by the Ministry of Communications based

Table 2.—Malaysia: Imports of communications equipment, 1972-75, projected 1980
(in millions of U.S. dollars)

	1972	1973	1974	1975	1980
Telephone sets	.4	1.1	.6	.3	2.0
Telephone switchboard and exchanges	2.7	4.7	5.1	4.0	14.5
Wire and cable	.7	.8	5.8	1.5	3.0
Telegraphic equipment	.1	.2	1.6	.4	.6
Parts for telephonic and telegraphic equipment	7.6	7.2	17.6	12.5	32.5
Radio telegraphic and telephonic equipment	1.2	2.3	1.9	1.5	6.5
Total	12.7	16.3	32.6	20.2	59.1

Source: Bureau of International Commerce, Office of International Marketing research study; values based on official Malaysian statistics and trade source estimates.

Additional Information

This Survey is one of a series based on market research reports prepared overseas for the Office of International Marketing. Other detailed marketing information on Malaysia is available on a continuing basis from:

Country Marketing Manager—Malaysia
Office of International Marketing
BIC/DIBA
U.S. Department of Commerce
Washington, D.C. 20230

A copy of the original research which this Country Market Survey summarizes is available at a cost of $10 from:

National Technical Information Service
U.S. Department of Commerce
Springfield, Virginia 22161
Sales desk telephone: (703) 557-4650

The report covers: (1) a detailed description of the national telecommunications network, (2) discussion of the market with special sections on products of particular interest to U.S. manufacturers, (3) descriptions of all major end-user sectors, (4) competitive situation, including United States, third-country and domestic suppliers, (5) tariff rates, and (6) lists of potential purchasers, trade associations and publications. Please request: "The Market for Communication Equipment and Systems: Malaysia." DIB 76-04-501, October 1975.

Information on the availability of published standards in Malaysia may be obtained from the National Technical Information Service, Technical Help to Exporters, Springfield, Virginia 22161.

Table 3.—Malaysia: Imports of communications equipment by country of origin, 1974

(in thousands of U.S. dollars)

Telephone sets	
United States	1.6
Singapore	317.9
Japan	85.8
Germany	67.0
United Kingdom	43.3
Others	73.6
Telephone switchboards and exchanges	
United States	17.0
Sweden	1,716.2
Netherlands	1,205.5
Japan	1,152.4
Germany	391.0
Others	2,195.1
Wire and cable	
United States	4.1
People's Republic of China	2,899.5
Republic of China	1,709.2
Sweden	348.1
United Kingdom	343.8
Others	471.2
Telegraphic equipment	
United States	30.4
Japan	806.7
Germany	668.4
Sweden	54.4
United Kingdom	26.3
Others	13.8
Parts for telephonic and telegraphic equipment	
United States	1,286.5
Sweden	5,945.5
Germany	4,328.2
United Kingdom	1,624.4
Netherlands	1,428.1
Others	2,985.8
Radio telegraphic and telephonic equipment	
United States	206.4
Japan	692.6
United Kingdom	879.9
Australia	31.2
Singapore	31.1
Others	65.0

Source: Bureau of International Commerce, Office of International Marketing research study; values based on official Malaysian statistics and trade source estimates.

on CCITT and CCIR standards. Malaysia is presently attempting to align its standards with those of Singapore, Thailand, the Philippines and Indonesia.

Major Purchasers

The Malaysian Government, through the Ministry of Communications, accounts for at least 80% of total communications equipment sales. (See table 4.) Products sold to the small private sector markets consist mainly of PABX equipment, intercom systems, radiotelephone equipment and components used by local manufacturers.

Government.—The Government purchases its communications equipment from domestic suppliers whenever possible, but all orders of large or advanced items must still be filled through international tender. Price rather than quality is the main consideration in purchase decisions.

The Ministry of Communications plans its equipment purchases according to the 5-year Malaysia Plans. The Third Plan began in 1976 and is discussed in detail above. Progress on the Second Plan fell behind and not all programs announced were contracted for, although the Government stated that eventually 96% of the funds appropriated for communications projects had, in fact, been expended. Other federal purchases may result from the several air and naval bases currently under construction.

The largest government user of communications equipment aside from the federal government is the Royal Malaysian Police, who annually add to their stock of VHF sets, walkie-talkies, PABX's and telephone stations. Local jurisdictions only purchase equipment (generally PABX's) in connection with their occasional building activities.

Manufacturing.—Malaysian manufacturing facilities tend to be small; of a total 3,372 establishments in 1971, 76% employed less than 50 persons. This is true of both locally- and foreign-owned companies. Sales to manufacturers are generally for limited orders of intercom systems, teleprinters and, in particular, telephone equipment.

Public utilities.—In 1974, the National Electricity Board spent $2.3 million on a powerline carrier system, $200,000 on VHF equipment, $42,000 on UHF equipment, and $250,000 on test equipment. Those levels of spending are forecast to continue for at least the next few years. Additions and replacements of PABX devices for power stations and offices are expected to be small. The Public Works Department uses walkie-talkie equipment and mobile radio units on project sites, but purchases of new equipment are small and infrequent.

Transportation.—The Third Malaysian Plan allocates $85 million for the 1975-80 period to modernize the country's outmoded railway system and includes $6 million for purchase of signaling and communications equipment. Total annual expenditure on railway communications equipment is forecast not to exceed $1 million. The existing railway

Table 4.—Malaysia: Projected sales distribution of communications equipment by end users [1]

(percent)

	Government								
	Military	Federal [2]	Local	Municipal	Manufacturing	Transportation services [3]	Public utilities	Hospitals	Education
Telephone sets	—	80	—	—	11	—	3	3	3
Telephone switchboards and exchanges									
Central office	—	100	—	—	—	—	—	—	—
Private branch	12	—	12	36	31	—	3	3	3
Wire and cable	—	100	—	—	—	—	—	—	—
Telegraphic equipment	—	100	—	—	—	—	—	—	—
Parts for telegraphic and telephonic equipment	—	50	—	—	50	—	—	—	—
Radio telegraphic and telephonic equipment	3	8	2	7	—	25	50	5	—

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[1] Figures represent sales to each end-user market segment as a percent of total sales of each type of equipment listed.

[2] Data for the Ministry of Communications is included here.

[3] Includes rail, marine (cargo and recreational), trucking, taxis, etc. Air transport services excluded.

Source: Bureau of International Commerce, Office of International Marketing research study.

communications system is based on overhead cables but connections to radio and telex systems are planned.

The Malaysian Airline System employs PABX telephone equipment in its offices at airports and in major towns, and new exchanges are installed as the system grows. Plans for 1976 included installation of a computerized booking system. The airline is one of Malaysia's largest users of intercoms, mobile radios and walkie-talkies. Annual expenditures for communications equipment by the Malaysian Air line system amount to about $125,000.

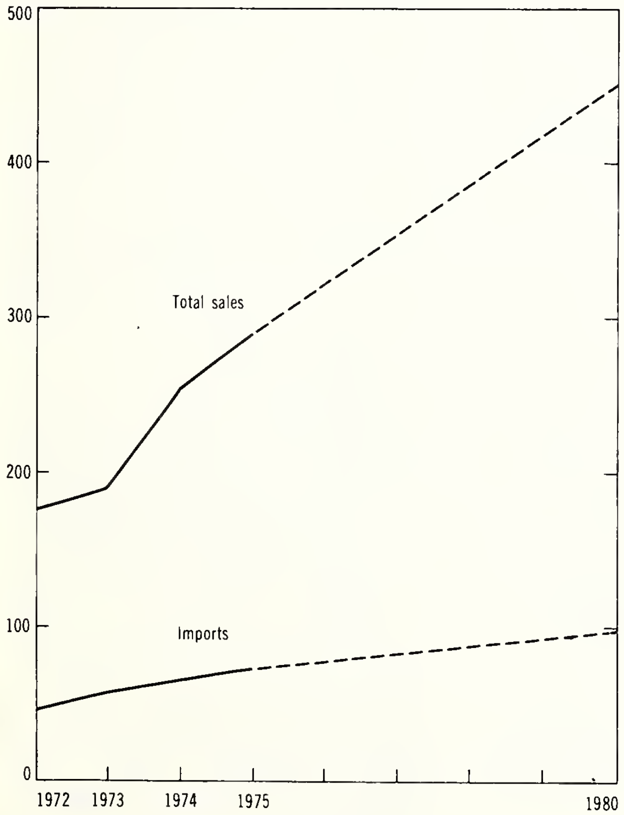
Minerals exploration.—The Malaysian oil industry offers one of the country's best potential markets for U.S.-built communications equipment. Esso and the Malaysian Government have negotiated a new offshore production agreement in the South China Sea. With this agreement, substantial quantities of communications equipment will be needed. With Esso as the field operator, U.S. equipment could be favored, particularly microwave and troposcatter equipment.

Mexico

Continued expansion by the government-sponsored telephone company, Telmex, will push sales of communications equipment in Mexico from $290 million[1] in 1975 to over $450 million in 1980. (See figure and table 1.) Telephone and telegraph equipment account for 97% of sales; Telmex and another government communications authority, DGT, are the only customers of these products and both take a strongly protectionist stance in their purchasing policies. Other types of equipment showing market growth are mobile radio equipment, CCTV and communications test equipment. The coming use of satellite transmission could open up other equipment markets in Mexico.

Mexico: Communications equipment market 1972-75, projected 1980

(in millions of U.S. dollars)



Source: Bureau of International Commerce, Office of International Marketing research study; values based on official Mexican statistics and trade estimates.

U.S. Sales Outlook

With sales of $6.3 million, U.S. suppliers provided about 10% of Mexico's total imports of communications equipment in 1974. (See tables 2 and 3.) Test equipment and nonbroadcast radio and TV accounted for well over half of these sales. Other U.S.-origin products which have sold well include central office telegraph equipment, voice converters, and codifiers.

American companies have been less successful in other market segments, most notably in the important area of telephone and telegraph equipment. Telmex gives its orders to domestic manufacturers whenever possible, and discourages competitive importation by giving the bulk of its import orders to two European suppliers, ITT Europe and Ericsson of Sweden. These two companies dominate the Mexican market for imported telephone and telegraph equipment and can be expected to continue in that position until local manufacturers are able to fill their place. U.S. sales in this category consist primarily of specialized components for telephone equipment ($1.2 million in 1974) and sophisticated items for installation on subscriber equipment ($1.1 million, 1974); both continue to have good U.S. sales potential in Mexico.

Sales of U.S.-manufactured microwave equipment, mainly video and message baseband radio, have been limited in the face of strong European

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[1] All values are shown in U.S. dollars. Local currency data are converted at the following exchange rate: US$1 = 12.5 pesos (1972 and subsequent years).

Mexico—Selected Indicators

Population (1975):	60,150,000
Gross domestic product (1975):	$60.5 billion
Installed telephones (1974):	2.5 million
Number of main stations (1975):	64
Number of telex subscribers (1975):	4.800

and Japanese competition. American firms have had little involvement in Mexico's satellite communications market, where most Earth station equipment is so far of Japanese manufacture.

Products with good sales potential for U.S. manufacturers include:

Nonbroadcast radio.—Sales of radio equipment are forecast to almost double over the 1974-80 period, rising from $2.4 million to $4 million. Imports contributed 17% of the market in 1974, registering sales of $417,000; U.S. firms were the leading suppliers, providing 70% that year.

Sales of mobile land equipment are forecast to reach $2 million in 1980. The trend is toward UHF equipment for 450-470 MHz, as the VHF bands (134-174 MHz) are becoming saturated. Uses of land mobile equipment are expanding rapidly; an application attracting interest is product distribution and delivery, the complexities of which have mounted significantly with Mexico's expanding industrial output and increasing urbanization. Marine radio sales are anticipated to reach $1 million in 1980; demand for this equipment will be stimulated chiefly by efforts to enlarge the nation's fishing fleet.

Sales of paging systems, which grew steadily during the early 1970's, are expected to double in the 1974-80 period, rising to $1 million. Trade sources estimate that paging services had some 10,000 subscribers in 1975 and are expanding at a rate of about 10% a year.

Signaling systems are relatively new in Mexico, and U.S. suppliers serve virtually the entire market. Government agencies and large public enterprises, the principal users, are primarily interested in pipeline and production control applications.

Closed circuit TV.—Sales of CCTV are expected to climb from the 1974 level of $1.4 million to $2 million by 1980. Trade sources believe that this market would grow much faster were it not for the trade restrictions currently imposed on it. Over 90% of this equipment is imported. U.S. sources are the leading suppliers of CCTV equipment, furnishing 71% of imports or $921,000 in 1974.

Over the next few years, CCTV systems will be installed in up to 10 airports, and at customs and immigration points. CCTV is also finding uses for training, plant security, and retail surveillance, for which the following equipment is in demand:

- Film cameras equipped with ½-inch lenses
- Monitoring devices with 6-inch to 11-inch screens
- Video recorders

Communications test equipment.—Sales of communications test equipment are forecast to grow from their 1974 level of $3.8 million to $6 million by 1980. Over 90% of this equipment comes from foreign sources. With sales of $2.3 million in 1974, U.S. suppliers provided two-thirds of these imports and should continue to hold this position in the market; quality and familiarity account for the strong showing of U.S.-made products.

The Mexican government's system of tariffs and import licensing puts all foreign manufacturers at an equal disadvantage except for members of the Latin American Free Trade Area, which have not yet become major factors in the market. Presently, imports are restricted to equipment not made locally but considered vital to public service or education and to parts and components intended for local assembly. Once a domestic industry commences manufacture of a particular product, its importation is shut off. Although these restrictions could ease somewhat if Mexico's trade balance improves, growth of imports will remain fairly slow, rising from over $72 million in 1975 to nearly $100 million in 1980.

Major import suppliers.—The three major suppliers of telephone and telegraph equipment to the Mexican market are ITT, Ericsson and Siemens. ITT and Ericsson provide 85% to 90% of the country's central exchanges and subscriber equipment. Siemens is the leading supplier of telex and telegraph equipment. ITT's imports are furnished by subsid-

Abbreviations

CCIR	Consultative Committee on International Radio.
CCITT	Consultative Committee on International Telephone and Telegraph
CFE	Comision Federal de Electricidad (Federal Electricity Commission)
DGT	Direccion General de Telecommunicaciones (Bureau of Telecommunications)
DTN	Direccion de Telegrafos Nacionales (Office of the National Telegraph Network)
INDETEL	Industria de Telecomunicacion, S.A.
INTELSAT	International Telecommunications Satellite Consortium
PEMEX	Petroleos e Mexicanos (Mexican Petroleum)
Telmex	Telefonos de Mexico (Mexico Telephone System)

Table 1.—Mexico: Market for communications equipment, 1972-75, projected 1980

(in millions of U.S. dollars)

	1972	1973	1974	1975	1980
Telephone and telegraph apparatus					
Central office exchanges [1]	92.8	88.3	139.4	150.0	220
Private branch exchanges (PBX, PABX)	4.1	8.0	7.4	7.6	13
Transmission equipment/systems	61.8	73.1	81.8	103.2	168
Other [2]	11.9	12.9	18.3	20.4	37
Data communications equipment	.8	.8	.9	1.0	1
Nonbroadcast radio and TV communications equipment					
Mobile radio, land	1.2	1.4	1.4	1.6	2
Mobile radio, marine	.4	.3	.5	.5	1
Paging systems	.3	.5	.5	.6	1
Closed circuit TV	.7	.9	1.5	1.1	2
Microwave components [3]	—	.1	.4	.8	1
Communications test equipment [4]	3.0	3.4	3.9	3.9	6
Total	177.0	189.7	256.0	290.7	452

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[1] Telephone only.

[2] Central office equipment n.e.s. and subscriber/user premise equipment.

[3] Sold separately.

[4] For other than laboratory use.

Source: Bureau of International Commerce, Office of International Marketing research study; values based on official Mexican statistics.

iaries in Belgium and France; Ericsson exports its components and subassemblies from Sweden, and Siemens from Germany. Local subsidiaries of these companies are among the largest domestic suppliers.

In the area of nonbroadcast radio and TV equipment, the U.S. firms General Electric, Motorola, and Westinghouse provide most UHF and VHF mobile fixed and portable radio equipment; competition is chiefly from Philips (Netherlands). Secode Electronics Engineering of Dallas is the leading supplier of long-distance alarm and signaling equipment. Principal U.S. manufacturers of paging systems are Motorola and Bell and Howell, with Nippon Electric Company (NEC) of Japan the most active competitor; transmission equipment is generally provided by General Electric while codifiers are from Bell and Howell, Fantrom, and Cone, all of the United States. General Electric, Motorola, and Webco supply most consoles. Participants in the CCTV market include Japanese, Dutch, and German firms.

Hewlett Packard and Systron Donner are the major U.S. suppliers of test equipment; other American participants include Tektronix, General Radio, Triplett, Simpson, B&K and Sencore. The chief foreign competitor is TMK of Japan.

Collins Radio is the largest U.S. supplier of microwave equipment; competition includes RCA (Canada), CSF and Thompson (France), Lorenz (Germany), NEC and Toshiba (Japan), and Teletra (Italy). NEC has been the major supplier of satellite communications equipment.

The Domestic Equipment Industry. — Mexico's communications equipment industry comprises about 50 firms and employs 25,000 to 30,000 persons; production was valued at $190 million in 1974, and projected growth indicates output of over $350 million in 1980. A significant portion of this production is local assembly of imported components. Major domestic suppliers and equipment lines are listed below:

Industria de Telecommunicacion, S.A. (INDETEL), owned by ITT, the Mexican Government, and private investors—telephone equipment: central office, PBX/PABX, multiplex, key systems, handsets, and circuit conditioning.

Teleindustria Ericsson, S.A., subsidiary of Ericsson, Sweden—telephone equipment: central office,

Table 2.—Mexico: Imports of communications equipment, 1972-75, projected 1980

(in millions of U.S. dollars)

	1972	1973	1974	1975	1980
Telephone and telegraph apparatus					
Telephone exchanges	34.0	40.5	45.4	50.0	77
Transmission equipment and systems	—	1.2	0.2	0.4	1
Other					
Central office	3.6	3.6	1.3	1.5	2
Subscriber/user premise equipment	3.1	6.7	11.9	13.8	11
Total	40.7	52.0	58.8	65.7	91
Data communications equipment	0.8	0.8	0.8	0.9	1
Nonbroadcast radio and TV communications equipment					
Mobile radio	1.3	0.6	0.4	0.3	—
Closed circuit TV	0.6	0.8	1.3	1.0	2
Total	1.9	1.4	1.7	1.3	2
Microwave components [1]	—	0.1	0.4	0.9	1
Communications test equipment [2]	2.9	3.2	3.5	3.5	4
Total, all communications equipment	46.3	57.5	65.2	72.3	99

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[1] Sold separately to manufacturers.

[2] For other than laboratory use.

Source: Bureau of International Commerce, Office of International Marketing research study; values based on official Mexican statistics and trade source estimates.

Table 3.—Mexico: Imports of communications equipment by country of origin, 1974

(in thousands of U.S. dollars)

	Total	USA	Germany	Belgium	France	Japan	Sweden	Other
Telephone and telegram apparatus								
Telephone exchanges	45,441	1,196	94	3,606	4,682	481	28,694	6,688
Transmission equipment and systems	206	—	206	—	—	—	—	—
Other:								
Central office n.e.s.	1,314	524	195	—	84	23	51	437
Subscriber/user premise equipment	11,865	1,113	6,030	2,609	38	178	996	901
Data communications equipment	820[1]							
Nonbroadcast radio and TV								
Mobile radio	417	290	12	—	—	—	—	115
CCTV	1,292	921	24	—	—	272	1	74
Microwave components[2]	400[1]							
Communications test equipment[3]	3,472	2,286	214	2	98	396	32	444
Total	65,227	6,330	6,775	6,217	4,902	1,350	29,774	8,659

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[1] Distribution by origin not available.

[2] Sold separately to manufacturers.

[3] For other than laboratory use.

Source: Bureau of International Commerce, Office of International Marketing research study; values based on official Mexican statistics and trade source estimates.

PBX/PBAX, multiplex, key systems, handsets, and circuit conditioning.

Comercial Electrica, S.A., partially owned by GTE—telecommunications systems, including transmission units (Lenkurt 25-D and FM-300).

Siemens Telecommunicaciones, S.A., subsidiary of Siemens, Germany—telegraph, telex, and some microwave equipment.

Matsushita Electric de Mexico, S.A., subsidiary of Matsushita, Japan—intercom systems.

General Electric de Mexico, S.A., subsidiary of General Electric, U.S.—mobile radio up to 35 watts.

Compania Motorola Mexicana, S.A., subsidiary of Motorola, U.S.—mobile radio.

Condumex, S.A., technical assistance from Pirelli, Italy—wire and cable.

The Communications Network

Mexico's telephone system served 2.5 million subscribers in 1974, and planned extensions will bring local and long distance service to all communities with more than 2,000 inhabitants and expand the number of subscribers to some 3.5 million by 1980. National telephone density was 4.55 telephones per 100 inhabitants in 1974. Close to one-half of the nation's telephones are business listings. Direct lines account for 54% of total service, with the remainder extensions of PBX and PABX units. All handsets are dial instruments, but touchtone will soon be available. The largest PABX unit currently in operation has some 260 lines and more than 2,000 extensions.

Over 75% of the telephone system's 2,800 central exchanges are manual or semiautomatic machines with fewer than 1,000 line capacity; most are installed in small towns or being moved there from the cities. Automatic, electromechanical crossbar units (from 2,000 to 10,000 lines) are replacing smaller exchanges in the cities. In the nation's three major metropolitan areas of Mexico City, Monterrey, and Guadalajara, semielectronic equipment is being introduced; the first of these centrals has a 20,000-line capacity and began operation in Guadalajara in 1975. By 1980 all local and long distance service in communities with more than 5,000 inhabitants will be automatic.

The telephone system had 7 million km of long distance lines in 1974. A long distance self-dialing system called LADA has been in operation since the last decade and connects with the Bell System in the United States. Rural service is outside the normal telephone system and so is provided by point-to-point radio.

The overall reliability of Mexico's telephone system is quite good, with a 99% completion rate for domestic calls and only slightly lower for international service. For domestic long distance calls, however, the completion rate is less than 80%, and problems are frequent with the LADA system.

The telex system is a star network with 5 nodal, 7 star, and 16 satellite centers. The 4,800 private subscribers represented about 80% of the system's capacity in 1975. Government agencies and state-owned enterprises account for 15% to 20% of telex subscribers. Equipment in central stations is chiefly TW-39, TW-56, and TWK-7 units.

The international service, using 96 telex and 83 telephone channels, has direct telex circuits with five countries and telephone telex connections with thirteen. Modes of international transmission include cable, radio, microwave, and satellite. Trade sources report international telex traffic is growing by almost

Table 4.—Mexico: Projected sales distribution of communications equipment by end users, 1980 [1]

(percent)

	Government			Munici-pal	Manu-facturing	Retail	Banking & insur-ance	Transpor-tation services [3]	Public utili-ties	Hos-pitals	Educa-tion	Mining & minerals explora-tion	Other
	Military	Federal [2]	Local										
Telephone and telegraph apparatus													
Central office telephone exchanges	—	100	—	—	—	—	—	—	—	—	—	—	—
Private branch exchanges	—	100	—	—	—	—	—	—	—	—	—	—	—
Transmission equipment/systems	1	99	—	—	—	—	—	—	—	—	—	—	—
Other:													
Central office equipment n.e.s.	1	99	—	—	—	—	—	—	—	—	—	—	—
Subscriber/user premise equipment	1	75	1	1	5	5	5	2	—	1	—	—	4
Nonbroadcast radio and TV communications equipment													
Mobile radio, land	5	20	7	6	6	4	3	10	12	15	—	4	8
Mobile radio, marine	5	5	—	—	—	—	—	90	—	—	—	—	—
Paging systems	—	5	—	—	5	—	—	—	—	15	—	—	75
Closed circuit TV	—	8	—	—	55	20	2	1	—	4	10	—	—
Communications test equipment [4]	2	55	2	1	20	5	—	5	5	—	—	1	9
Percent all equipment [5]	1	95	1	1	1	1	—	—	—	—	—	—	—

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[1] Figures represent sales to each end-user market segment as a percent of total sales of each type of equipment listed.

[2] Data for Telmex, DGT and DTN are included here.

[3] Includes rail, marine (cargo and recreational), trucking, taxis, etc. Air transport services excluded.

[4] For other than laboratory use.

[5] Excludes data communications equipment and microwave components.

Source: Bureau of International Commerce, Office of International Marketing research study.

35% a year while the increase in domestic traffic is about 20% annually.

The domestic and international telegraph systems are interconnected but function as separate units. The domestic telegraph network ran more than 162,500 km of telephone and telegraph lines in 1975, carried over 59.5 million messages, and provided service through some 3,500 branches, including 68 radiotelephone and 33 radiophonic offices. Presently most equipment is semiautomatic, but plans are underway to fully automate and update domestic service with teleprinters and duplex equipment replacing antiquated equipment.

The international telegraph service is more highly automated than the domestic system; it includes five stations and eight fully automated (computerized) centrals. International traffic exceeded 1.5· million messages in 1974 and is reportedly expanding about 4% a year.

The railroad operates its own telegraph service, through 52,000 km of line and 904 offices. A DGT-operated cable network of 27,000 km handled some 1.3 million messages in 1974; its use is increasing.

Mexico's 64 main stations handle transmission for the telephone, telex, and telegraph services, utilizing a 62,000-km wire and cable carrier system as well as microwave, satellite, and multiplex (up to 1,800 channels) facilities. Transmission units are primarily Lenkurt 25-D and FM-300. Of the carrier system's 3,089 channels, 68% are currently in use. The telegraph system utilizes 1.8 million km of line. No open wire carrier equipment has been used in Mexico since the microwave facilities came into operation.

The Mexican microwave network, consisting of 76 terminals and 211 repeater stations (as well as 6 passive repeaters), has a capacity of 8 million circuit lines for telephones. It also provides 45,000 channel-km for television and has a reserve capacity of 27,000 channel-km. The bulk of this equipment was purchased shortly before the Olympic Games in 1968. Digital equipment is not presently utilized in the network.

The satellite communications stations at Tulcancingo, which has a radiotelephone carrier with a capacity for 132 bidirectional circuits for telephones, two-way carriers for color TV and sound channels, is tied into the microwave network. It is also linked to the inter-Atlantic channel of INTELSAT-4-F3 for 12 hours daily and leases a channel (full time) on INTELSAT-4-S7. The spade system was initiated in 1974. Expansion plans call for establishment of telephone, facsimile, and telex communications via the Westar I satellite.

Mexico observes CCITT regulations for international communications. Local traffic is regulated by the DGT, which is responsible for issuing and enforcing standards. Some carrier equipment used only in the national network is outside CCITT standards.

DGT owns all telex subscriber equipment used in Mexico; private ownership has been prohibited since 1967. Telmex sells various types of key systems as well as switchboards to its subscribers. Private purchase and installation of key systems are not expressly forbidden, but Telmex will not service equipment from any but approved, local manufacturers, which it regards as "nonstandard".

Handsets and PBX/PABX used by Telmex subscribers are generally owned by that company and supplied on a rental basis, the major exceptions being unusually large PABX units purchased and imported in the mid-1970's by banking enterprises and by the government-owned oil company, PEMEX.

Major Purchasers

Government.—The Federal Government is Mexico's largest user of communications equipment, accounting for about 95% of the total market. (See table 4.) The major purchasers are Telefonos de Mexico (Telmex), the Bureau of Telecommunications (DGT) and the Office of the National Telegraph System (DTN).

Telmex provides 97% of Mexico's telephone service; it will control the entire telephone system by 1980, once it absorbs the two independent telephone companies operating near the U.S. border, Telefonos Nacionales and Compania Telefonica Fronteriza. Telmex was formed in 1950 by the merger of two privately owned national networks. The Mexican Government acquired a controlling interest in 1970, and the company has since operated as part of the government sector.

Telmex is one of the largest profitmaking enterprises in Mexico; its capital investments more than doubled in the 1970-75 period and are expected to total $1.8 billion between 1976 and 1980. Replacement and relocation of central exchange equipment will absorb about half the company's investments over this period, with external installations for local service and long distance equipment (including lines) the other major items. Telmex's annual investments are expected to reach $437 million in 1980.

Standardization of equipment is an important factor in Telmex's purchasing policies; the company prefers to deal with a limited number of suppliers to simplify maintenance requirements, and has granted preferential status to sources that assemble and manufacture equipment in Mexico. This arrangement greatly benefits ITT and Ericsson and accounts for their strong position in the Mexican market.

DGT operates the telex, international telegraph, and rural telephone services as well as the microwave network, satellite and maritime communications, and a facsimile circuit. Investments exceeded $9.8 million in 1973; however, the pace of new investments slowed in 1974-75 as DGT postponed major projects while awaiting the report on Mexico's communications requirements. The microwave network generally absorbs about a third of DGT's expenditures; other large items include research and development (about 15%) and cable and carrier circuits (about 10%).

DGT also aims to standardize its equipment, and relies upon Siemens as its chief supplier of telex and telegraph equipment. Broader sourcing prevails in its purchases of microwave network, largely because no single supplier was able to complete the network in time for the 1968 Olympics. Two recently initiated services will add to DGT's equipment requirements: extension of the rural radiotelephone program, which began in 1975 with service to four states, is under consideration, and remote areas in three more states will probably be added to service capabilities; and, a new facsimile circuit is just beginning operation, serving the cities of Monterrey, Guadalajara, Veracruz, Nuevo Laredo, and Merida.

The domestic telegraph network is operated by DTN. Investments totaled some $1.3 mililon in 1975, with installation and rehabilitation of telephone and telegraph lines absorbing about 40% of the total. DTN also prefers to deal with a limited number of suppliers for its equipment requirements.

Military and local authorities also purchase some communications equipment. The military chiefly uses mobile radio (both land and marine) and some telephone equipment. State and municipal governments buy mobile radio equipment for police and other public services; they also constitute a small market for subscriber/user equipment.

Manufacturing.—Mexico's manufacturing industries consist of about 12,300 companies employing some 1.3 million workers; approximately 400 firms employ more than 500 persons. With total output valued at $86.6 billion, the sector contributed 23% of the gross domestic product in 1974.

Use of communications equipment among manufacturers is steadily expanding, and the sector is expected to provide a market of over $4 million in 1980. Test equipment constitutes the largest item in the sector's purchases ($950,000 in 1974). CCTV follows closely in volume ($840,000 in 1974); manufacturing represents 60% of the Mexican market for this equipment in 1974. Trade sources anticipate continued growth in test equipment demand and sales of over $1.6 million in 1980.

Another area of growth is mobile radios, used in production distribution systems. Traffic congestion in Mexico's major cities has focused attention on outmoded distribution and delivery operations, so that many companies now purchase mobile radio equipment to coordinate and increase the efficiency of these activities. Other items bought by the manufacturing sector are paging systems, key systems, interphones and recording and answering devices. Companies in areas not served by Telmex still buy some PABX and transmission equipment; however, Telmex is expected to assume responsibility for supplying this equipment by 1980.

Retail.—The retail sector includes some 430,000 enterprises and employs over one million persons. Around 80% of Mexico's retail establishments are owner operated and have no paid employees; more than 1,300 firms employ over 50 workers, and 80 enterprises have more than 250 employees.

The retail sector's purchases of communications equipment are forecast to increase more than fourfold in 1974-80, reaching some $2.5 million. Retailing is Mexico's second largest user of CCTV equipment; surveillance and training are the principal applications. Trade sources forecast the sector's demand for CCTV will nearly double from 1974 to around $400,000 in 1980. Retail establishments are also expected to increase their purchases of communications test equipment, mobile radio systems and user premise equipment, including key systems, interphones, and recording and answering devices.

Transportation.—Sales of communications equipment to the transportation industry are forecast to reach $2.1 million in 1980. Mobile radio and user premise equipment are the major items of purchase. Private marine users buy substantial quantities of mobile radio, and transportation services account for 12% of the market for mobile land units. Important users are radio-equipped taxi services and security transport companies.

Hospitals.—This sector will represent a market of about $900,000 for communications equipment in 1980. Mexico's more than 2,000 hospitals are important users of mobile radio equipment and are among the chief purchasers of paging systems and CCTV.

Additional Information

This Survey is one of a series based on market research reports prepared overseas for the Office of International Marketing. Other detailed marketing information on Mexico is available on a continuing basis from:

Country Marketing Manager—Mexico
Office of International Marketing
BIC/DIBA
U.S. Department of Commerce
Washington, D.C. 20230

A copy of the original research which this Country Market Survey summarizes is available at a cost of $10 from:

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Springfield, Virginia 22161
Sales desk telephone: (703) 557-4650

The report covers: (1) a detailed description of the national telecommunications network, (2) discussion of the market with special sections on products of particular interest to U.S. manufacturers, (3) descriptions of all major end-user sectors, (4) competitive situations, including U.S., third-country and domestic suppliers, (5) tariff rates, and (6) lists of potential purchasers, trade associations and publications. Please request: "The Market for Communication Equipment and Systems: Mexico." DIB #76-04-502, October 1975.

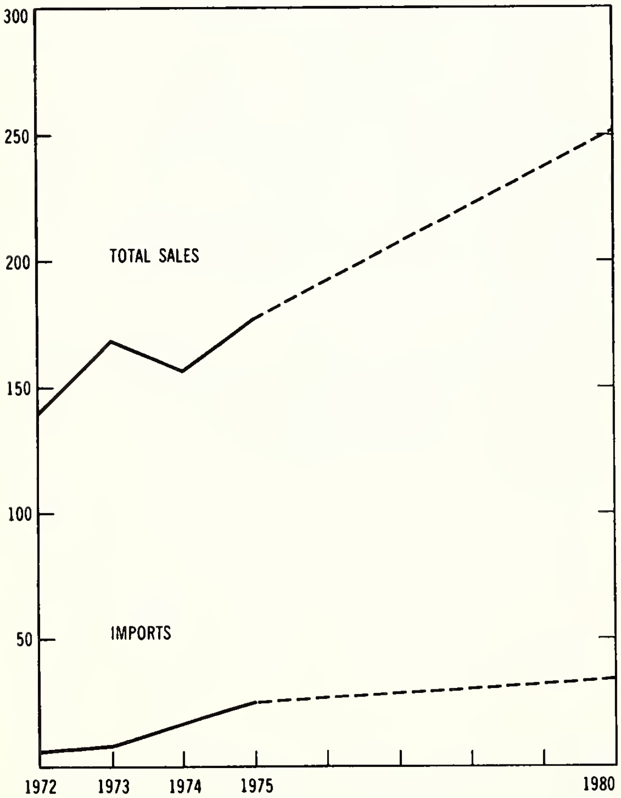
Information on the availability of published standards in Mexico may be obtained from the National Technical Information Service, Technical Help to Exporters, Springfield, Virginia 22161.

Republic of China

The Republic of China has committed itself to developing a fully modern telecommunications system; a major Seven Year Plan (1974-81) will invest almost $2 billion in the country's national and international communications network, which the Government sees as an important indicator of national growth. The total market for communications equipment in Taiwan is expected to rise from $178 million [1] in 1975 to over $250 million in 1980. (See figure and table 1.)

Republic of China: Communications equipment market, 1972-75, projected 1980

(in millions of U.S. dollars)



Source: Bureau of International Commerce, Office of International Marketing research study; values based on official Republic of China statistics and trade source estimates.

U.S. Sales Outlook

Imports (excluding those related to the Earth station and components for central exchange equipment) rose from 5% of the total communications equipment market in 1972 to 14% of the market in 1975, and are predicted to maintain at least this share throughout the remainder of the 1970's. U.S. suppliers are second only to the Japanese, who hold about half of the foreign sales. U.S. manufacturers accounted for over 40% of all communications equipment imported into Taiwan in 1974; they dominate the markets for electronic exchanges, microwave systems, data communications systems, mobile radios and test equipment. (See tables 2 and 3.) Subscriber/user premises equipment also offers increasing sales to foreign manufacturers.

Financing is an important element in sales to the Republic of China. Following the loss of access to U.N.-sponsored services and funds, Taiwan has been forced to make loans tied to purchase-agreements favoring the creditor nation. The major source of such financing has been the United States and Japan, and in recent years the Government has adopted a policy of limiting its purchases from Japan to improve its balance of trade with that country.

The following types of equipment offer the best sales prospects for American manufacturers:

Telephone and telegraph transmission equipment.—The market for transmission equipment is expected to increase from $109 million in 1975 to nearly $160 million by 1980. Imports of transmis-

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[1] All values are shown in U.S. dollars. Local currency data are converted at the following exchange rates; US$1=NT$40 (1972); US$1=NT$38 (1973 and subsequent years).

Selected Indicators—Republic of China

Population (1975 estimated):	**16.3 million**
Gross national product (1975):	**$14.4 billion**
Installed telephones (1975):	**1 million**
Number of main stations per $100,000 GNP (1974):	**12.93**
Number of computers (1975):	**61**
Number of telex subscribers (1974):[1]	**1,819**

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[1] A total of 2,425 telex units were in service in Taiwan at this time, but the Government and large companies which use multiple units have been counted here as single subscribers.

sion equipment from the United States stood at more than $1.7 million in 1975.

Although most needs for wire and cable are met by local industry, specialized items are imported. Interference caused by the electric railway will require all communication lines near the tracks, including the railway's own lines, to be replaced with coaxial cable. Coaxial cable is now imported from Japan, but an expanding market and more competitive pricing should offer opportunities for American penetration.

The Chinese Government is currently investigating the applications of a 24-channel digital multiplex carrier, but no purchase had been made to date. The country's microwave and satellite systems have only been recently completed and further equipment orders are not anticipated in the next few years; the microwave system was constructed by GTE and ITT, both American, and the satellite system by NEC of Japan.

Other telephone and telegraph apparatus.—The market for PBX and PABX equipment is forecast to rise over $4 million in 1975 to $9 million in 1980. Local manufacturers presently dominate the PBX/PABX market in Taiwan but do not produce electronic PABX units. Trade sources predict that a major opportunity for American suppliers will open up when electronic exchanges become operational in the next few years. Automatic dialing units are expected to be in greatest demand.

Sales of subscriber/user premises equipment are expected to double by 1980, approaching $16 million. There is considerable interest among Chinese businessmen in devices such as automatic dialing and call rerouters, call directors, conference call equipment, answering and recording devices, and low- and medium-speed teleprinters, none of which is produced locally. U.S. manufacturers accounted for 11% of the 1975 imports of this equipment, with sales of $361,000.

Communications test equipment.—The market for test equipment is expanding with the growth of the local telephone system; it is forecast to increase from its 1975 value of $1 million to over $1.6 million in 1980. The national telephone company, the TTA, estimates that about 3% to 5% of its expenditures for electronic exchanges and transmission facilities goes for test equipment.

A 3-year campaign by the TTA to reduce line-noise will require considerable purchases of noise-measuring instruments. Other test equipment expected to be in demand includes signal generators, sweep generators, frequency counters, oscillators, oscilloscopes, telephone test sets and volt-ohm meters.

Data communications equipment.—Because of the limited number of computers in use in Taiwan and the current Government restriction of data communications to leased lines between offices of the same company, the market for this equipment remained small through the mid-1970's. However, trade sources predict that use of data communications equipment will expand as the use of computers grows, and that demand will increase rapidly after 1977 when dial-up data communication is scheduled to begin. Dial-up service would permit data-processing centers to communicate with their users via telephone and thus speed data entry and return. While many companies cannot justify an in-house computer system, they could use a service bureau if data transmission services were available. Foreign firms now transfer quantities of sales and other financial and manufacturing data via telex to the United States and Europe.

Table 1.—Republic of China: Market for communications equipment 1972-75, projected 1980
(millions of U.S. dollars)

	1971	1973	1974	1975	1980
Telephone and telegraph apparatus					
Central office exchanges....	12.8	9.9	11.6	44.8	53
Private branch exchanges .	2.4	3.6	3.7	4.3	9
Transmission equipment ..	118.1	145.9	124.7	108.7	158
Other[1]	4.7	5.8	7.9	11.1	16
Data communications equipment	—	.1	.2	1.4	1
Nonbroadcast radio and TV communications equipment					
Mobile radio, land	1.5	1.8	3.5	2.6	5
Mobile radio, marine	1.0	1.2	2.3	1.8	3
Paging systems	—	—	—	.5	1
Other mobile equipment ..	.3	.3	.6	.5	1
Closed circuit TV	—	.3	.8	1.3	3
Microwave components	—	.1	.1	.1	—
Communications test equipment[2]	.4	.8	.8	1.0	2
Total	141.2	169.8	156.2	178.1	252

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[1] Central office equipment n.e.s. and subscriber/user premises equipment.

[2] For other than laboratory use.

Source: TTA and trade source estimates.

Abbreviations

CGRA	**Chinese Government Radio Administration**
DGT	**Directorate General of Telecommunications, a division of the Ministry of Communications**
Taipower	**Taiwan Power Company**
TTA	**Taiwan Telecommunications Administration**
TL	**Telecommunications Laboratory**
TTI	**Telecommunications Training Institute**

Chinese users transmit at speeds of 2,400 and 4,800 bits per second (bps), though 1,200 bps is also used. Products in demand include electronic switches, intermediate-speed modems and multiplexers. Trade sources expect that complete systems including terminals multiplex units and other hardware necessary to complete the system will be in greatest demand. In 1974, U.S. firms supplied all imports in this category. Local manufacture of data communications equipment is not expected in the foreseeable future.

Nonbroadcast radio and TV communications equipment.—The demand for mobile radio equipment, supplied entirely by imports, is expected to rise to over $8 million in 1980. U.S. manufacturers, with sales of over $4.4 million in 1974, accounted for almost 70% of all mobile radio sold (both land and marine). Trade sources predict significant sales potential over the next few years for transmitters (30-100 W), motor vehicle transceivers (30 W), pocket and hand portable transceivers (1-10 W), signaling systems, consoles, test and patch facilities and scan converters.

By law, mobile radios are used only by government agencies and corporations, and no change in the restrictions against private use is anticipated. The military is the major user, but other government agencies are also important consumers. Most mobile radio imports are standard, transistorized models. Fixed station equipment is usually in the 30-100 Watt range; portable radios, 1-10 Watt; and mobile radios, 30 Watt. While most U.S.-origin equipment will met Taiwan's standards, demand is greatest for equipment in the VHF bands 25-50 and 32-14 megahertz.

The Telephone Administration established an experimental one-way paging system for Taipei in 1975 requiring one-way paging units of the same narrow band frequencies as two-way radios. Should the system prove successful, it will be expanded further in Taipei and other cities.

The Domestic Equipment Industry.—The Taiwan communications equipment industry employs about 10,000 workers. Major producers have foreign affiliations; about 15 domestically-owned companies manufacture telephone switchboards, and 60 wire and cable. Between 1974 and 1980, the value of switchboard production in Taiwan (including export items) is expected to rise from about $17 million to almost $70 million; the value of wire and cable production is projected to increase from $73 million to almost $200 million.

The major domestic manufacturers are Taiwan Telecommunications, licensee of Nippon Electric (Japan) and Far Eastern Electric, licensee of Oki (Japan). Both produce central exchange equipment, PBX/PABX, wire and cable and control consoles. Pacific Wire and Cable and Walsin Lihwa Wire and Cable manufacture wire and cable; minor producers include China Wire and Cable and Tatung Wire and Cable. Cosmopolitan Electric and Tongya Telecommunications manufacture PBX/PABX equipment. With the encouragement of the Taiwan

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Table 2.—Republic of China: Imports of communications equipment, 1972-75, projected 1980
(in thousands of U.S. dollars)

	1972	1973	1974	1975	1980
Telephone and telegraph apparatus					
Central office exchanges, mechanical and electronic voice:					
Large (over 3,000 lines)	1,640	942	1,429	9,794	9,800
Private branch exchanges, mechanical and electronic, voice:					
Over 900-line systems	—	—	801	284	400
Transmission equipment:					
Wire and cable	265	511	1,278	1,967	2,800
Microwave	—	826	512	625	300
Multiplex	—	506	253	308	200
Satellite [1]	—	—	—	—	—
Other:					
Central office equipment[2]	83	157	28	258	400
Subscriber/user premises equipment	655	701	4,334	2,911	5,200
Subtotal	2,643	3,643	8,635	16,147	19,100
Data communications equipment [3]					
Switches	—	—	—	1,066	300
Modems: 1,201-9,600 bps	—	58	93	115	200
Multiplexers	—	26	45	52	200
Subtotal	—	84	138	1,233	700
Nonbroadcast radio and TV communications equipment					
Mobile radio, land:					
Transmitters (bay stations)	512	608	1,152	874	1,600
Receivers (vehicle)	819	972	1,843	1,397	2,600
Receivers (portable)	205	243	461	349	700
Mobile radio, marine:					
Transmitters (bay station)	683	810	1,536	1,164	1,900
Receivers	342	405	758	582	1,000
Paging systems	—	—	—	500	500
Other mobile equipment	284	337	640	485	1,100
Closed circuit TV	—	252	789	1,315	3,300
Subtotal	2,845	3,627	7,179	6,666	12,700
Microwave components	—	100	50	50	100
Communications test equipment[4]	439	843	789	1,075	1,600
Total, all communications equipment	5,927	8,297	16,791	25,171	34,200

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[1] Project costs for Earth stations completed in 1969 and 1974 are not available, but the major portion of the equipment was imported from Japan.

[2] Equipment in this category is generally purchased as part of a system.

[3] Data communications equipment is generally purchased as a system rather than by individual components: figures shown are estimates of system requirements.

[4] For other than laboratory use.

Sources: The Trade of China (Taiwan District), compiled and published by the Statistical Department, Inspectorate General of Custom, Taipei, Taiwan, and trade source estimates.

Government, GTE and ITT have recently established subsidiaries in Taiwan to manufacture electronic switches. The ability of these suppliers to meet local needs increases each year. Most of their sales are to the Government, whose "buy national" policy excludes foreign imports from competition with local products.

The Communications Network

The Republic of China's telecommunications system is highly centralized; all planning, development and operations are controlled by the Directorate General of Telecommunications (DGT), a division of the Ministry of Communications. The volume carried by the telecommunications system in 1974 was as follows: local telephone calls, about 1.3 billion; toll calls, 56 million; international calls, 2.4 million; domestic telegraph, 40 million words; and international telegraph, 19.4 million words.

The Taiwan Telecommunications Administration (TTA) is the operating arm of the DGT responsible for telephone and telex services. In accordance with its current Seven Year Plan, the TTA is exerting major efforts toward improving and expanding voice communication. Telephone density, which reached 6.2 per 100 population in 1975, is expected to total 17.5 per 100 by 1980. The proportion of telephones installed for residential use

Table 3.—Republic of China: Imports of communications equipment[1] *by country of origin, 1974*
(in thousands of U.S. dollars)

	Total	United States	West Germany	Italy	Japan	Netherlands	Hong Kong	Other
Telegraph and telegraph apparatus								
Central office exchanges, mechanical and electronic voice:								
Large (over 3,000 lines)	1,429	114	—	100	1,200	15	—	—
Private branch exchanges, mechanical and electronic, voice:								
401-900 line systems	801	96	—	—	705	—	—	—
Transmission equipment:								
Wire and cable	1,278	63	—	—	1,215	—	—	—
Microwave	512	512	—	—	—	—	—	—
Multiplex	253	253	—	—	—	—	—	—
Satellite[2]	—	—	—	—	—	—	—	—
Other:								
Central office equipment	28	28	—	—	—	—	—	—
Subscriber/user premises equipment	4,334	333	280	280	3,380	43	4	14
Data communications equipment								
Modems: 1,201-9,600 bps	93	93	—	—	—	—	—	—
Multiplexers	45	45	—	—	—	—	—	—
Nonbroadcast radio and TV communications equipment								
Mobile radio, land:								
Transmitters (bay station)	1,151	799	—	148	195	9	—	—
Receivers (vehicle)	1,843	1,276	—	237	316	14	—	—
Receivers (portable)	461	319	—	60	79	3	—	—
Mobile radio, marine:								
Transmitters (bay station)	1,536	1,065	—	198	261	12	—	—
Receivers	758	527	—	97	128	6	—	—
Other mobile equipment	640	439	—	82	114	5	—	—
Closed circuit TV	789	—	—	—	789	—	—	—
Microwave components	50	50	—	—	—	—	—	—
Communications test equipment[3]	789	789	—	—	—	—	—	—
Total, all communications equipment	16,790	6,801	280	1,202	8,382	107	4	14

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[1] Excludes military equipment except for mobile radios.

[2] Project costs for the Earth station completed in 1974 were not available.

[3] For other than laboratory use.

Source: The Trade of China (Taiwan District), compiled and published by the Statistical Department, Inspectorate General of Customs, Taipei, Taiwan, and trade source estimates.

should also continue to increase; from 1964 to 1974, residential telephones rose from 23.6% to 47.5% of total phones installed. Manual switchboards are used in rural areas and crossbar switching is used in all other locations. Between 1975 and 1980 central exchange facilities are expected to add 266,000 crossbar and manual lines and 66,510 electronic lines annually.

Data transmission over leased lines has grown at an average annual increase of 20% over the past 5 years. About 500 leased telephone/telegraph circuits were available in Taiwan in 1975, but not all were used for data transmission. Digital transmission available over the present system is used primarily by telex equipment.

The first Earth satellite station in Taiwan was installed in December 1969, and by June 1974 it provided 125 direct-voice circuits plus 8 to 10 data circuits via the Pacific Ocean satellite. In January 1974, a second Earth station was completed serving Europe via the Indian Ocean satellite; it now provides 25 direct-voice circuits plus 4 to 6 data circuits. Each station is equipped with two transmitters. The satellite system is used for voice, data and video transmission. Voice transmission is via an international operator who schedules all calls.

The telex system has operated by direct dial since 1972 and is being computerized. There are 127 international telex channels and 16 international telegraph channels. Rented channels are also available for video transmission.

The telegraph system in Taiwan is operated by the Post Office, while the telex system is operated directly by the TTA. Telegraph service is both domestic and international; all telex messages are international. The increasing use of telex service, coupled with the decline in the volume of trade

Table 4.—Republic of China: Projected sales distribution of communications equipment by end users, 1980[1]

(percent)

	Government			Manufacturing	Retail	Banking & Ins.	Transportation[4]	Public utilities	Hospitals	Education	Mining	Other
	Military[2]	Federal[3]	Municipal									
Telephone and telegraph apparatus												
Central office exchanges	20	80	—	—	—	—	—	—	—	—	—	—
Private branch exchanges	80	20	—	—	—	—	—	—	—	—	—	—
Transmission equipment	20	80	—	—	—	—	—	—	—	—	—	—
Other[5]	20	40	—	15	10	3	1	1	2	2	1	5
Data communications equipment	NA	—	—	25	—	40	—	35	—	—	—	—
Nonbroadcast radio and TV communications equipment												
Mobile radio, land	70	18	10	—	—	—	—	1	—	—	—	1
Mobile radio, marine	75	25	—	—	—	—	—	—	—	—	—	—
Paging systems	—	100	—	—	—	—	—	—	—	—	—	—
Other mobile radio[6]	100	—	—	—	—	—	—	—	—	—	—	—
Closed circuit TV	15	15	30	5	—	5	—	20	—	5	—	5
Microwave components	50	50	—	—	—	—	—	—	—	—	—	—
Communications test equipment[7]	35	55	—	10	—	—	—	—	—	—	—	—
Total[8]	24	72	1	1	1	—	—	1	—	—	—	—

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[1] Figures represent sales to each end-user market segment as a percent of total sales of each type of equipment listed.

[2] Details on use of equipment by military were not available. These estimates are based on information collected during interviews with suppliers.

[3] Data for the TTA are included here.

[4] Includes rail, marine (cargo and recreational), trucking, taxis, etc. Air transport service excluded.

[5] Central office equipment n.e.s. and subscriber/user premises equipment.

[6] Excludes all air mobile nonbroadcast communications equipment.

[7] For other than laboratory use.

[8] Rounded to nearest full percentage point.

Source: Bureau of International Commerce, Office of International Marketing price and study; shares based on official Taiwan statistics and trade source estimates.

during the economic recession, has caused a recent decline in the use of the telegraph services. In 1974, the telegraph system had 109 international circuits and handled 4,500 messages daily.

Telephone subscribers are permitted to install their own devices on their trunkline, a practice which has led to the use of a wide variety of equipment. All private exchanges must be approved by the TTA, but only 14% of the boards are actually provided by the TTA. Of the 9,531 private exchanges in use in 1974, 3,962 were small push-button systems; only 185 handled 200 or more lines. PBX extensions numbered 218,600 that year with an average 6.2 extensions per trunkline. Installation of a single trunkline telephone costs $477. The demand still remains higher than the supply, and the wait for telephone installation averages 2 to 3 months. Waiting time for a telex can be as long as 1 to 2 years in the Taipei area.

Major Purchasers

Government.—The national Government, the military and municipal Governments account for more than 97% of all purchases of telecommunications equipment in Taiwan. Government-owned banks and corporations, discussed below in their respective sections, account for most of the remainder. The market share of the national government and the military are predicted to stay about the same through 1980. (See table 4.) Municipal Governments' share could rise slightly due to increased investment in CCTV. Total government expenditures for communications equipment are projected at over $240 million for 1980.

With a U.S. Export-Import Bank loan of $27 million, the Chinese Government is considering immediate purchase of the following imported items: electronic switchboard (50,000 lines), $9.5 million; coaxial cable, $3.6 million; 6-GHz microwave (PCM), $1.4 million; toll switching equipment, $3 million; equipment for measuring traffic, $50,000 and consulting services, $600,000.

In addition to investments in telecommunications equipment, the TTA expects to increase its capital expenditures (buildings, land, and rights of way) from less than $145 million in 1974 to almost $323 million in 1976. Capital expenditures are estimated at $290 million in 1980.

Public utilities.—Utilities are expected to increase their purchases of communications equipment from about $300,000 in 1974 to over $1 million in 1980. Taipower, the major utility and the only one controlled by the central government, generates and distributes all the electricity used in Taiwan. It is permitted to operate its own communications network, which includes a private microwave system for communications between major cities and offshore islands. The utility also operates a mobile land radio system for dispatching repair crews and coordinating construction activities.

Taipower is also an important buyer of data communications equipment. Bills now are processed by a central computer in Taipei distributed through the post. Taipower is designing one of the country's most extensive data communication systems to transmit data directly between its branches and the central office in Taipei. Purchase and installation of the system are to be completed within the next 3 to 5 years. Taipower handles its own procurement of equipment.

Manufacturing.—Most manufacturing enterprises in Taiwan are small, family-owned factories with few communications facilities beyond one telephone. About 300 companies in Taiwan have more than 350 employees and annual sales of over $4 million. These large companies are potential purchasers of conference equipment, call directors, recording devices and automatic dialing equipment. Purchases of these products exceeded $1 million in 1974 and are predicted to surpass $2.7 million in 1980. Government-owned corporations could prove good customers for data communications equipment and subscriber/user equipment.

Retailing.—The retailing sector is predicted to increase its expenditures for communications equipment from less than $500,000 in 1974 to more than $1.5 million in 1980. Profits of the large department stores are rising; trade sources speculate that these major retailers could be a market for data communications and special subscriber/user equipment.

Banking.—Although growth of the banking industry has not been spectacular, its purchases of communications equipment will none the less continue to increase as a result of changing requirements within the industry. The Bank of Taiwan currently is experimenting with a telecommunications system which trade sources speculate could be the model for the entire Taiwan banking industry. At the same time, four major banks are participating in a program to modernize the country's banking system through greater use of data communications. The Government has taken a strong interest in this possibility. Data communications equipment purchases are forecast to total nearly $275,000 in 1980, while purchases of subscriber/user premises equipment and miscellaneous central office equipment are expected to account for sales of over $470,000.

Saudi Arabia

With massive amounts of oil money and a long-range program to modernize the national economy, the Kingdom of Saudi Arabia presents a highly lucrative market for communications equipment to U.S. manufacturers. Sales of $8 million [1] in 1972 rose to over $52 million in 1974 and are continuing to grow with such energy that projections of future sales are impossible. (See table 1.)

There is no local manufacture or assembly of communications equipment in Saudi Arabia, and so the entire market is supplied by imports. U.S. firms held $3.7 million, or 7% of the 1974 market (see table 2); they have been strongest in sales of thermionic valves, photocells, transistors and other basic components, but future orders should lie in the area of more advanced equipment such as CCTV and mobile radio systems. Three of the American companies that have been successful in the Saudi communications market are: A. D. Little (consulting work), RCA (CCTV) and General Electric (mobile radio). COMSAT operates the country's two mobile earth stations for satellite transmission.

The United Kingdom and Japan are important third-country competitors in this market. British sales exceeded $900 million in 1974; a large part of these were accounted for by two firms, Plessey and G.E.C. The Saudi Arabian government imports through other Arab countries whenever possible, and so much of its imports are handled by companies in Lebanon and Bahrain. Important foreign companies in Saudi Arabian communications equipment market include:

Consulting work
Norconsult (Norway)
Swedtel (Sweden)
Preece, Cardew and Rider (U.K.)

Equipment
L. M. Ericsson (Sweden)
Plessey (U.K.)
G.E.C. (U.K.)
S.E.L. (Germany)
Siemens (Germany)
Philips (Netherlands)
SIRTI (Italy)
B.T.M. (Belgium)

Mitsubishi of Japan is installing the country's two permanent earth stations. Ericsson supplied the bulk of Saudi Arabian's telephone exchanges until Philips won the contract for new equipment in 1976. New telex equipment will come from B.T.M. and teleprinters from S.E.L. and Siemens.

All sales, whether to public or private customers, must be handled through a Saudi national. Prospective suppliers can apply directly to individual gov-

Table 1.—Saudi Arabia: Market for communications equipment, 1972 and 1974
(in millions of U.S. dollars)

	1972	1974
Electrical line telephone and telegraph equipment	5.47	18.19
Microphones, loudspeakers, amplifiers	.55	2.79
Other telecommunications equipment	.55	26.12
Office machines n.e.s.	.14	.38
Thermionic etc., valves and tubes, photocells, transistors, etc.	.28	.53
Other electrical measuring and controlling instruments and apparatus	1.01	1.36
Total	8.00	49.37

Source: Ministry of Finance and National Economy, Central Department of Statistics.

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[1] All values are shown in U.S. dollars. Local currency data are converted at the following exchange rates: U.S. $1 = 4.15 SRls (1972), 3.69 SRls (1973), and 3.55 SRls (1974 and subsequent years).

Saudi Arabia—Selected Indicators

Population (1975):	**7 million**
Gross domestic product (1975):	**$13.2 billion**
Number of main stations (1975):	**23**
Number of telex subscribers (1975):	**3,700**

ernment Ministries for details of future projects and discuss with them suitable agents through whom to work.

The Communications Network

The Ministry of Telecommunications, in cooperation with the Ministries of Finance and Planning, builds and operates all public telecommunications facilities in Saudi Arabia. Planning is done on a national basis; local and municipal government authorities can only advise the Ministry on their requirements. The chief vehicle for constructing a national telecommunications network is the current Five Year Development Plan. The Kingdom completed its first plan-period in 1974. Among its major accomplishments were the installation of over 100,000 automatic telephones, introduction of teleprinters and installation of the country's two mobile stations for satellite transmission, as well as accomplishment of certain organizational and personnel (training) objectives.

The present telephone population in Saudi Arabia is nearly 200,000 instruments, served by 23 automatic exchanges in 10 cities. A private system of 10,000 lines and 3 exchanges owned by the Aramco oil company also connects with the national network.

Saudi Arabia's single major transmission system connects the oil producing areas in the eastern part of the country with the administrative capitals in the west. The system uses coaxial cables with microwave links in the mountainous areas. Aside from this link, long-distance communications must be carried over HF radio.

The intercity telephone network is limited, but beginning to expand; the Taif-Riyadh line, formerly a 4-circuit HF link, has been reinforced with a 44 circuit dual facility that will soon be expanded to 120 circuits, and the Jidda-Riyadh link is now 260 channels, so that it is now possible to direct-dial other major Saudi cities from Riyadh.

International telephone traffic from the Kingdom roughly doubles every year; 867,000 outgoing international calls were recorded in 1974. Until now overseas communication has been via radiotelephone and HF radiotelegraph with some usage of the Bahrain earth station, but in the First Development Plan period (1970-74), two mobile ground stations were constructed at Riyadh and Jidda to carry traffic from the Comsat satellite over the Indian Ocean, and these are being augmented by permanent installations by Mitsubishi of Japan which can handle high-quality telegraph, telephone, and telex circuits at a capacity sufficient for the country's needs well into the future. The Arab League is jointly building a telecommunications satellite at an estimated cost of $150 million. It is scheduled for completion in 1977 and is expected to accommodate 5,000 to 7,000 high-quality channels interconnecting all the Arab capitals.

Telegraph and telex service has been transmitted over HF radio until recently; now 3,700 lines carrying telex and teletype channels are multiplexed over the telephone system (24 teletype per voice channel). There are no dedicated data transmission lines in Saudi Arabia; this transmission is accomplished over the telephone network through Government-supplied modems.

The use of mobile radio communications equipment is limited to the emergency services and the oil interests. The police forces use the VHF band with a usable range of 30 km. Aramco has some 900 base stations serving 1,800 mobile radio sets for use in normal field engineering and an HF radio system for deep desert work. CCTV is utilized primarily for educational purposes, monitoring of crowds at the great pilgrim centers and for surveillance in prisons, customs areas, banks, and the ministry buildings.

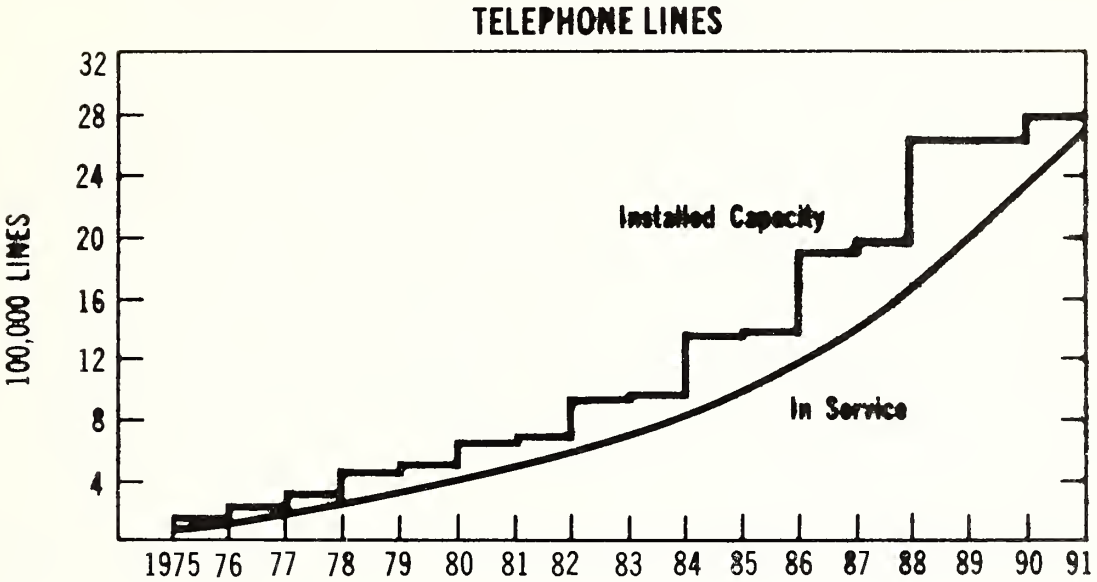
Saudi Arabians purchase equipment of a very high technological level. The minimum requirements acceptable to the Ministry of Communications are those recommended by the CCITT and the CCIR. In some instances, the Ministry insists on a higher standard, but all installation frequencies and procedures are compatible with international standards. All private equipment must be approved by the Ministry before it can be connected to the public network.

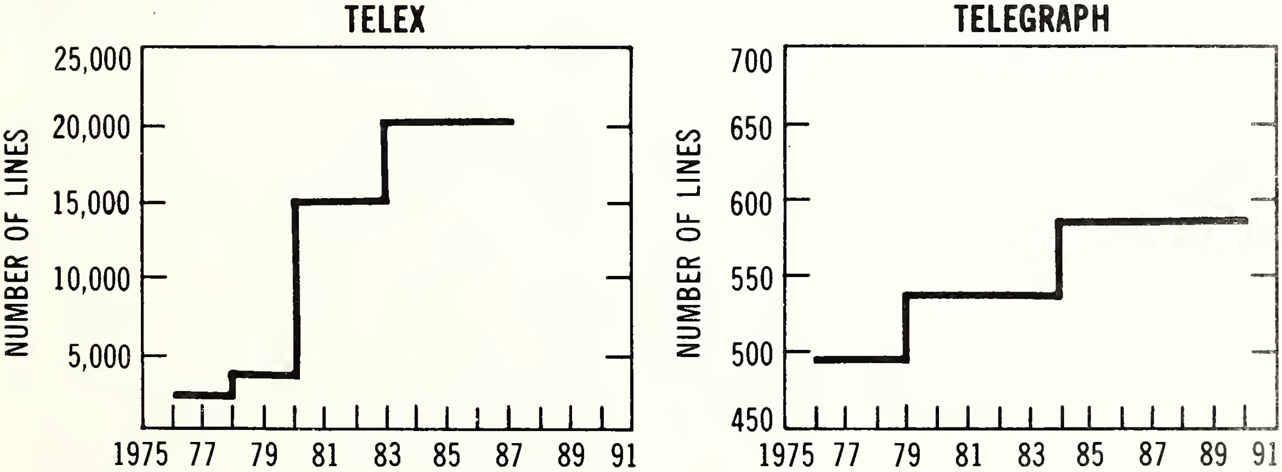
The Second Five-Year Development Plan

Saudi Arabia's future requirements of communications equipment will be largely determined by the national Five-Year Development Plan, which began in 1975 and will end in 1980. The total expenditures in this plan are expected to be nearly $150 billion, of which $1.2 billion will be spent for upkeep and expansion of the country's telecommunications systems. The First Development Plan (1970-74) budgeted $216 million for telecommunications purposes. Highlights of the new Plan are:

- Increase of installed telephone lines to 490,000 and installed capacity to 666,000, bringing telephone density to 20 instruments per 100 persons in larger cities and 5 per 100 in small communities. (See figure on page 3.)
- Completion of the two-phase Intra-Kingdom Transmission network to link all important

Saudi Arabia: Projections of long-range telecommunications growth





Source: Second Five-Year Development Plan.

Table 2.—Saudi Arabia: Imports of communications equipment by country of origin, 1974
(in thousands of U.S. dollars)

Electrical line telephone and telegraph equipment	
United States	475.7
Germany	7,286.8
United Kingdom	661.5
Lebanon	430.8
Others	9,337.1
Total	18,191.9
Microphones, loudspeakers, amplifiers	
United States	200.3
Bahrain	168.1
Japan	200.3
Germany	53.3
Belgium	1,142.0
Others	1,030.1
Total	2,794.1
Other telecommunications equipment	
United States	2,541.3
Japan	12,928.2
United Kingdom	53.6
Bahrain	1,746.3
Lebanon	85.6
Others	8,769.4
Total	26,124.4
Office machines n.e.s.	
United States	—
Japan	48.3
Germany	169.7
Lebanon	52.7
Denmark	55.8
Others	53.0
Total	379.5
Thermionic etc., valves and tubes, photocells, transistors, etc.	
United States	77.6
United Kingdom	86.7
Germany	68.5
Japan	114.3
Others	187.0
Total	534.1
Other electrical measuring and controlling instruments and apparatus	
United States	443.7
United Kingdom	118.5
Lebanon	76.2
Germany	361.8
Italy	170.4
Others	260.4
Total	1,361.8

Source: Ministry of Finance and National Economy, Central Department of Statistics.

points in the Kingdom; this network will place 90% of Saudi Arabia's population within an area of long-distance telephone service.

- Installation of two permanent satellite earth stations, as described above.
- Laying of a coaxial cable across the Red Sea, connecting Jidda with Port Sudan, giving the Kingdom cable transmission through the Sudan to Europe.
- Further development of telex capacity and its extension to more cities.
- Organization of a separate government-sponsored entity that will be responsible for the Kingdom's telecommunications network.
- Study of possible use of such advances as: electronic switching, digital transmission, electronic mail delivery and color-television transmission.

This program involves 72 individual local telephone projects, construction of 10 transit-trunking stations for the Intra-Kingdom Transmission Network, 45 individual projects related to telegraph and telex transmission and establishment of 5 monitoring stations.

Other Communications Equipment Requirements

Emergency services.—The Saudi Ministry of Interior is considering purchase of a UHF radio communications system for the highway patrol from the Sanders Associates Corporation (U.S.). UHF equipment is necessary to increase the range for patrols working in desert areas. The police employ eight RCA CCTV cameras to monitor the pilgrim traffic at Al Haif, and plans are under consideration for expanding the system to 250 cameras at an expected cost of $14 million. The new system would include other areas of the country and data concerning traffic and pilgrim density would be fed to a central monitoring station.

Transportation services.—Saudi Arabia is rapidly developing its seaports. Construction at Jidda is expected to increase that port's capacity from 1.7 million tons of cargo in 1973 to 3 million tons by 1978; Damman's capacity will be raised to 2.8 million tons. Yaribon is similarly being enlarged, and studies are underway to develop 10 smaller ports—six on the Red Sea and four on the Arabian Gulf. Such development will increase demand for communications equipment such as PBXs and CCTV. An integrated system within the context of the national network is likely, approved and financed by the central Government and the Port Authorities.

Education.—The education sector continues to expand at an impressive rate. The school budget was increased from $606 million in 1974 to $883 million in 1975, and enrollment rose from 441,374 in 1970 to 599,515 in 1973; the number of students in higher education facilities increased from 3,349 to 5,253. CCTV is used extensively in educational facilities throughout the Kingdom, both in areas lacking proper facilities and in large institutions, where female students must be physically segregated from male instructors according to Islamic law. The cost of the existing system is thought to be $14 million.

Hospitals.—The health of the Kingdom's inhabitants is of great importance to the Government, and a major hospital rebuilding program is now underway. The King Faisal Hospital in Riyadh and similar facilities in Jidda are models of modern hospital development—internal communications systems and CCTV for teaching and patient monitoring are the most advanced available. The shortage of suitably qualified national medical practitioners will undoubtedly lead to an increased usage of initial diagnostic aids and computers, and will necessitate an increased demand for telecommunications equipment.

Banking.—Trade and industry in Saudi Arabia are served by 12 local and foreign banks, whose headquarters are in Jidda and branch offices are spread throughout the country. The three clearinghouses are in Jidda, Riyadh, and Damman. This is an area of great growth in the country, and its need for communications equipment will continue to expand as the use of centralized computing facilities, facsimile transmission, and internal telephone systems becomes more common.

Additional Information

This Survey is one of a series based on market research reports prepared overseas for the Office of International Marketing. Other detailed marketing information on Saudi Arabia is available on a continuing basis from:

**Country Marketing Manager—Saudi Arabia
Commerce Action Group for the Near East
DIBA/BIC
U.S. Department of Commerce
Washington, D.C. 20230**

A copy of the original research which this Country Market Survey summarizes is available at a cost of $10 from:

**National Technical Information Service
U.S. Department of Commerce
Springfield, Virginia 22161
Sales desk telephone: (703) 557-4650**

The report covers: (1) a detailed description of the national telecommunications network, (2) discussion of the market with special sections on products of particular interest to U.S. manufacturers, (3) descriptions of all major end-user sectors, (4) competitive situation, including U.S., third-country and domestic suppliers, (5) tariff rates, and (6) lists of potential purchasers, trade associations and publications. Please request: "The Market for Communication Equipment and Systems: Saudi Arabia." DIB 76-04-503, September 1975.

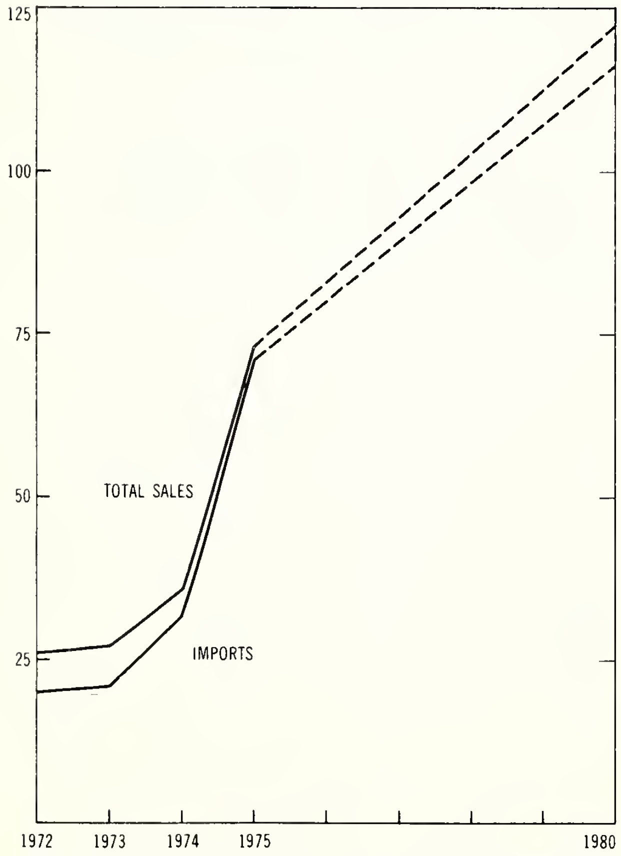
Information on the availability of published Standards in Saudi Arabia may be obtained from the National Technical Information Service, Technical Help to Exporters, Springfield, Virginia 22161.

Singapore

An ongoing effort by the Telecommunications Authority of Singapore (TAS) to upgrade the national telecommunications network doubled Singapore's communications equipment market from 1974 to its 1975 level of $73 million.[1] (See figure and table 1.) To increase telephone density 150% during the 1974-79 period, TAS has projected an annual budget increase of at least 10%, leading trade sources to forecast a 1980 equipment market of over $120 million.

Singapore: Communications equipment market, 1972-75 projected 1980

(in millions of U.S. dollars)



Source: Bureau of International Commerce, Office of International Marketing research study; values based on official Singapore statistics and trade estimates.

Most of Singapore's communications equipment needs are met by overseas suppliers. The nation is a major world port and a distribution point for communications products as to visiting vessels and neighboring countries such as Indonesia and Malaysia. Communications equipment imports, including those for re-export, exceeded $70 million in 1975 and are projected to grow to $116 million by 1980. (See table 2.)

U.S. Sales Outlook

U.S. manufacturers accounted for 17% of the 1974 import market or $5.4 million, and were the major providers of insulated submarine and other electric cable and wire, and peripheral telecommunications apparatus. On the basis of past performance, U.S. firms should raise their share of imports to over 35% or around $40 million in 1980. Their best sales opportunities will probably be found in electronic central office exchanges, transmission equipment, and teleprinters.

End users have a high regard for the durability, efficiency, and versatility of American-made products, but find U.S. prices high, particularly when compared to Japanese goods. Buyers report that U.S. companies have established direct representation in Singapore, preferring to use local agents. These agents have not been given sales and service support competitive with Japanese, British, and Dutch suppliers.

Central office exchange equipment.—Sales of central office equipment are projected to rise from $20.5 million in 1975 to $33 million by 1980; all of

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[1] All values are shown in U.S. dollars. Local currency data are converted at the following exchange rates: US$1=S$2.82 (1972) and S$2.49 (1973 and subsequent years).

Singapore—Selected Indicators

Population (1975):	**2.25 million**
GNP (1975):	**$5.6 billion**
Installed telephones (1975):	**290,000**
Number of computers (1975):	**107**
Number of telex subscribers (1974):	**1,170**

this equipment is imported. Fujitsu (Japan), presently the main supplier of central office exchanges, has been providing C400 crossbar type equipment, but a full commitment by TAS to convert to electronic exchanges in the future offers opportunity for potential suppliers.

TAS is now testing electronic exchange switching systems for possible use, and stored program control will probably be purchased for some new exchanges and the expansion of existing exchanges before 1980. New bids are solicited every 2 to 3 years and bidding is open to all companies which TAS considers as potential suppliers. No nationality restrictions or import duties would impede American sales.

Private branch exchange equipment.—Sales of PMBX ($900,000 in 1975) and PABX ($2 million) are projected to show a steady increase through 1980, when their combined sales should reach $5 million. Procurement of electronic PBX systems is expected to occur before the end of the decade; General Telephone and Electronics International Inc. supplies about 10% of the market. Philips (Singapore) Pte. Ltd. (subsidiary of Philips, Netherlands) holds 50% of the PABX market with systems assembled in Singapore from imported components. Plessey (United Kingdom) is the major supplier of PMBX equipment from its manufacturing plant in West Malaysia.

The most salable U.S. equipment is PABX s in the over-100-line category. American firms have not been price competitive in smaller exchanges. Reliability is the prime requirement among private sector users, such as hotels and large trading and manufacturing companies.

Transmission equipment.—TAS spent $34 million for transmission equipment in 1975 and plans to increase its investment to $55 million yearly by 1980. The major demand is for wire and cable. Local companies supply most of the aboveground telephone wire; underground and submarine cable is purchased through international tenders from overseas suppliers, mainly in Japan, Australia, and the United Kingdom. TAS follows ITU standards for all transmission equipment; wire and cable must meet British Post Office specifications.

In recent years, TAS has been converting its transmission operations to pulse code modulation (PCM). So far over 300 of the PCM systems have been ordered, all supplied by G.T.E.I.I. By 1977, PCM systems will account for 7,700 telephone channels.

Annual demand for microwave transmission equipment, including microwave components, has been minimal, not exceeding $120,000. The sole supplier is C. Itoh, representing Nippon Electric Company (NEC). NEC also installed the two Earth satellite stations on Sentosa Island. Plans for a third Earth station linking Singapore with Indonesia and Malaysia via a regional satellite are now being revived; if built, construction should begin around 1979. Currently some demand exists for broadband data link equipment; TAS uses digital modulator/single carrier equipment.

Other telephone and telegraph equipment.—Sales of handsets, amplifiers, phase and frequency-delay equalizers, echo suppressors, intercom equipment, call directors, and teleprinters (all acquired solely by TAS) amounted to $12.7 million in 1975. Teleprinters accounted for $2.1 million in sales and are forecast to rise by an average 30% annually to $8 million by 1980. Most teleprinters in use operate in the intermediate-speed range of 2,400 bits per sec-

Table 1.—Singapore: Market for communications equipment,[1] *1972-75, projected 1980*

(in millions of U.S. dollars)

	1972	1973	1974	1975	1980
Telephone and telegraph apparatus					
Central office exchanges..	7.4	7.5	9.5	20.5	22
Private branch exchanges..	1.5	2.0	2.5	2.9	5
Transmission equipment:					
Underground cable	9.9	10.0	12.7	27.3	44
Other	2.3	2.5	3.2	6.7	11
Other:					
Teleprinters	.4	.9	1.5	2.1	8
Other[2]	3.8	3.0	4.1	10.6	17
Date communications equipment	.1	.2	1.3	1.3	—
Nonbroadcast radio and TV communications equipment					
Mobile radio, land	.2	—	.5	.7	1
Mobile radio, marine	.1	.1	.2	.2	1
Paging systems	—	—	.2	.2	1
Closed circuit TV	.2	.3	.4	.4	1
Microwave components[3]	.1	.1	.1	.1	—
Communications test equipment[4]	.1	.1	.1	.1	—
Total	26.1	26.7	36.3	73.1	122

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[1] Excluding sales to the military sector.

[2] Central office equipment n.e.s. and subscriber/user premise equipment.

[3] Sold separately.

[4] For other than laboratory use.

Source: Bureau of International Commerce, Office of International Marketing research study; values based on official Singapore statistics and trade source estimates.

Abbreviations

CCIR	**Consultative Committee on International Radio**
CCITT	**Consultative Committee on International Telephone and Telegraph**
IFRB	**International Frequency Registration Board**
ITU	**International Telecommunications Union**
PSA	**Port Authority of Singapore**
TAS	**Telecommunications Authority of Singapore**

ond (bps). Some 70% are modern, semi-electronic machines, with the balance made up of older, mechanical ITT-Creed types. Fully electronic teleprinters were introduced in 1976 as older devices began phasing out. U.S. advances in electronic technology will give American firms an advantage, although price will remain a key consideration.

Other types of telephone and telegraph equipment, especially handsets and amplifiers, show good growth prospects over the next 5 years. NEC dominates the handset market with 55%, while Fujitsu supplies other central office exchange equipment.

Mobile radio.—The market for land and marine mobile radio equipment totaled $900,000 in 1975 and should climb to $1.6 million annually by 1980. Motorola leads suppliers of land mobile radios with 50% of the market in 1975; a combination of U.S. companies, including RCA and Collins Radio, held about 25% of the marine radio market. Thomson-CSF of France recently won a TAS bid to supply an automatic mobile radio network with a total capacity of 40 channels capable of handling 1,000 subscribers.

Mobile radio equipment now in use is fairly modern, but the two major end users, Police Headquarters and the PSA, still plan to upgrade their networks within the next 5 years. Both organizations have been impressed with the superior reliability of American-made portable receivers.

The island-wide radio tone paging service introduced by TAS in 1974 is gaining acceptance in Singapore, as shown by the rapid increase in subscribers, who numbered 651 in early 1975. Primary users include service institutions, equipment maintenance people, PSA, hotels, and department stores. Sales of paging systems were $200,000 in both 1974 and 1975 but are expected to grow to $500,000 by 1980. Motorola is currently the sole supplier. TAS plans to upgrade its paging service by adding voice communication to the present tone system. Direct subscriber contact service for the domestic telephone network is being studied.

Closed circuit TV.—CCTV usage is a relatively new phenomenon in Singapore. Less than 50 establishments have installations and 1975 sales were around $400,000. However, many businesses and other organizations in the Republic are becoming surveillance conscious and CCTV sales are projected to rise by an average 20% yearly to around $1 million in 1980. Most banks are considering installation of CCTV security systems. Other potential users are department stores, supermarkets, luxury high-rise apartments and manufacturers of high-precision instruments such as electronics equipment. Major suppliers are Japanese (such as Hitachi-Shibadan and Asaka), British (Rediffusion and Pye) and Dutch (N. V. Philips).

Communications test equipment.—Two U.S. firms, Hewlett-Packard and Tektronix, together control about 50% of the Singapore market for communications test equipment (including those for laboratory use). GEC of the United Kindom is also a major supplier. Sales, excluding those to the military, average about $100,000 per year. The three major users, TAS, PSA, and the Police, are upgrading their test equipment as part of their modernization programs. American products most likely to be in demand are oscillators/oscilloscopes, frequency counters, and volt-ohmmeters.

Domestic Equipment Industry.—Production of Singapore's communications equipment industry was valued at $8.6 million in 1974 and is projected at $9.1 million in 1980. The six most significant manufacturers are all either joint ventures or subsidiaries

Table 2.—Singapore: Imports of communications equipment, 1972-75, projected 1980

(in millions of U.S. dollars)

	1972	1973	1974	1975	1980
Telephone and telegraph apparatus					
Central office exchange	4.9	5.4	8.5	20.9	35
Private branch exchange	1.0	1.5	2.2	3.0	5
Transmission equipment					
Wire and cable	11.4	11.3	14.2	32.1	52
Satellite transmission equipment	—	1.3	1.3	.3	—
Data communications equipment	.1	.2	1.2	1.3	—
Other	2.8	1.6	3.7	12.7	22
Nonbroadcast radio and TV communications equipment					
Mobile radio and paging equipment	.3	.2	.6	.8	1
Closed circuit TV	.1	.2	.2	.2	1
Microwave components	—	—	—	—	—
Communications test equipment	.1	.1	.1	.1	—
Total	20.7	21.8	32.0	71.4	116

Source: Bureau of International Commerce, Office of International Marketing research study; values based on External Trade Statistics, Republic of Singapore and trade source estimates.

Table 3.—Singapore: Projected distribution of communications equipment sales by end users, 1980[1]

	Government[2]		Manufacturing	Retail	Banking and Insurance	Others[3]
	TAS	Others				
Telephone and telegraph apparatus						
Central office exchanges	100.0	—	—	—	—	—
Private branch exchanges	30.0	5.0	35.0	5.0	10.0	15.0
Transmission equipment	100.0	—	—	—	—	—
Other[4]	100.0	—	—	—	—	—
Nonbroadcast radio and TV communications equipment						
Mobile radio, land	10.0	75.0	10.0	—	—	5.0
Mobile radio, marine	10.0	75.0	—	—	—	15.0
Paging systems	100.0	—	—	—	—	—
Closed circuit TV	—	—	15.0	15.0	25.0	45.0
Communications test equipment[5]	24.0	70.0	5.0	—	—	5.0
Total	95.0	1.0	2.0	—	1.0	1.0

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[1] Figures represent sales to each end-user market segment as a percent of total sales of each type of equipment listed.

[2] Does not include military.

[3] Includes transportation, hospital, education, mining and hotel sectors.

[4] Central office equipment n.e.s. and subscriber/user premise equipment.

[5] For other than laboratory use.

Source: Bureau of International Commerce, Office of International Marketing research study; values based on official Singapore statistics and trade source estimates.

of foreign firms. Most of these plants were established to provide specific products to the TAS under contracts entered into by the parent companies. The six:

Philips (S) Pte. Ltd. (N. V. Philips)

Fujitsu (S) Pte. Ltd. (Fujitsu)

Singapore Electronics and Telecommunications Co. Pte. Ltd. (GEC)

Sigma Cables Pte. Ltd. (General Scientific)

Far Eastern Cables and Switchgear Ltd. (Japanese joint venture)

Communications Electronics Ltd. (joint venture between the Government of Singapore and American and Israeli parties)

In awarding contracts, TAS favors local manufacturers whose bids do not exceed their foreign competitors' by more than 5%. Foreign communications equipment is admitted duty-free into Singapore.

The Communications Network

The Telecommunications Authority of Singapore operates the country's domestic and international telecommunications services, other than broadcasting and television. It also regulates telecommunications, and issues permits and enforces standards based on CCITT, CCIR, and IFRB regulations. Singapore's telephone network comprises 182,000 exchange lines served by 16 domestic and 2 international telephone exchanges in 1975. Business users accounted for 38.1% of the subscribers. An international subscriber dialing service, introduced in late 1975, enables direct dialing to seven countries; international station-to-station service to 20 countries was already available. Data transmission capability is provided over the international switched telephone network, though not on the domestic network.

All central office exchanges have a minimum capacity of 10,000 lines. Switching systems are generally Strowger step-by-step and LME-crossbar types. TAS recently began using semiautomatic cordless C400/C410 crossbar switching systems. About 75% of the switching systems installed on subscribers' premises are automatic PMBX types with PABX making up the balance.

The transmission network is primarily wire and coaxial cable. The line plant network consisted of over 300,000 distributed cable pairs in 1975; the junction cable network was of 346,200 km of circuits. Singapore has one microwave link with peninsular Malaysia, providing telephone, telegraph and telex services. The link will have an ultimate capacity of 1,800 telephone channels, of which 1,200 are in operation.

The two Earth satellite stations, one beamed at the Indian Ocean path and the other at the Paffic Ocean path, utilize a total of 140 voice channels and 1 video channel. Some 10 international data transmission networks are operating with transmission speeds ranging from 1,200 to 9,600 bps, while 11 domestic networks operate at speeds from 300 to 4,800 bps.

The satellite stations use a 100-foot antenna and require low-noise amplifiers, feed and transmission lines, low-noise receivers, tracking control system and consoles, cryogenic equipment and up-and-down converters. Access is by frequency division demodulation. The system operates on 6 GHz from station to satellite and 4 GHz from satellite to station. The frequency band allocation shifts depending on regional needs. In view of Singapore's small area, there is and will be no need for group-band transmission.

International telex and telegraph services are available to all parts of the world. Singapore's fully automatic telegraph service runs on a computer-based message switching system. Complete facilities are available for the transmission and reception of phototelegrams. Installation of a totally electronic telegraph and telex system has produced an automatic service of very high quality. At present, 132 international telegraph circuits are leased to commercial organizations.

Generally, mobile radio usage in Singapore has been minimal inasmuch as the domestic telephone system suffices for most users. There were 159 subscribers for land and 124 for marine mobile radio in 1975. The police had 11 base stations, and the bus company, the Public Utilities Board, and an oil company had one each. Some 4% of the 3,400 vessels registered in 1974 had marine mobile radios served by a single shore station.

Mobile radio communications systems must be licensed; a minimum of 15 sets is required for land systems. Although TAS regulates all PBX and mobile radio equipment, these products, CCTV and communications test equipment can be purchased directly from the manufacturer by the end user.

Major Purchasers

Telecommunications Authority of Singapore.—TAS is expected to account for 90 to 95% of the communications equipment market in Singapore through 1980. (See table 3.) The Authority launched a development plan in April 1974 aimed at upgrading the country's telecommunications facilities and increasing the telephone density from the present 12 per 100 population to 28 per 100 by 1979. To attain its objective, TAS budgeted $68 million for capital expenditures in FY 1975-76 with 10% yearly increases.

Specfic objectives include expanding five of the existing central office exchanges and adding seven new exchanges. Cable pairs will continue to be added at a rate of 40,000 to 45,000 a year. TAS plans to extend the domestic microwave system to Pulau Ayer Merbau, the site of Singapore's proposed petrochemical complex.

The international telephone exchange is being enlarged from the present 46 positions to 193 by the end of 1977, and the number of channels increased from 236 lines to 386. The international telex exchange will double in capacity from 125 to 250 lines to cope with the planned expansion of the national telex exchange from 1,700 to 2,700 lines. TAS also intends to introduce data transmission service over the domestic switched telephone network.

TAS has converted its operator-assisted mobile radiotelephone service to fully automatic operation. The first phase, involving conversion of eight channels, will benefit 200 subscribers out of the existing 379; in the second phase, four systems of eight channels each will be installed.

Singapore has been selected by the ITU as the regional center for monitoring radio interference in the Asia-Pacific region. The project, assisted by the United Nations, should be in operation by 1978. Designs have already been submitted for upgrading the facilities of the existing monitoring stations. TAS is also building a new administrative headquarters, called "COMcentre." The COMcentre will cost $15.3 million and will be ready for occupancy by late 1978.

Other government agencies.—The Port of Singapore Authority (PSA) and the Police accounted for 2.3% of the 1974 communications equipment market. PSA, the sole operator of all Singapore ports, is the main end user of marine mobile radio equipment. Its 81-200 line PABX system is currently being expanded into a 400-900 line system. For the 1976-80 period, PSA has budgeted a total $2.8 million for telecommunications equipment, including $1.2 million for expanding the PABX system, $80,000 for multiplex transmission systems and subscriber/user premises equip., $1.5 million for mobile radio, $20,000 for CCTV, and $30,000 for communications test equipment.

The 8,000-man police force uses a PABX system of 40 incoming lines and 400 extensions, 20 teleprinters, communications test equipment, and several types of mobile radio: 920 walkie-talkies (with a 2-mile range), 30 relay stations, and 165 mobile radio sets (70 of them ship-to-control for use by the marine police). Over $4 million has been budgeted for communications equipment over the next 5 years, virtually all of it for mobile radio equipment.

TAS, PSA and the Police all purchase communications equipment independently, although the TAS is always consulted by the others. The Central Supplies Office, which coordinates most of the purchases of the nonstatutory government sector, buys communications equipment for government organizations such as hospitals, schools, and courts.

Manufacturing.—Singapore had 2,200 manufacturing companies of more than 9 workers, altogether employing 202,000 people in 1974. The most important export industries are electrical and electronic products, textiles and garments, and timber and woodworking. Government efforts to convert Singapore to a regional technology center have led to domestic production of precision instruments, machine tools, oil field equipment, construction and materials handling equipment, and ships. A petrochemical complex with a mainstream ethylene capacity of 300,000 tons per year should be operational by 1980. Within the next 5 years, the manufacturing sector will see an increasing proportion of high-technology and capital-intensive industries and a declining share of those which are labor-intensive. Telecommunications equipment needs will consist principally of subscriber premises equipment, particularly PABX's and teleprinters for establishments serving overseas markets.

Banking and insurance.—Singapore held 172 banks, finance and insurance companies with a total of 22,000 employees in 1974. Assets totaled $5.7 billion. Since the Government hopes to make Singapore the financial center of Asia, merchant and offshore banking operations are likely to expand, further linking Singapore to the financial centers of New York, Zurich, and London. Data links to central offices and branches overseas will be needed, creating demand for teleprinters, modems, and other data communications facilities.

The requirements for data transmission in the domestic banking field are bringing the upgrading of existing PABX systems. The government-operated Post Office Savings Bank has already invested in an on-line data transmission system. The largest commercial bank in Singapore, the Oversea-Chinese Banking Corporation is also planning to go on-line. Use of CCTV by banking institutions for security purposes is increasing.

Hospitals.—The Government's plan to establish Singapore as a major regional medical center includes expansion of hospital facilities and the creation of specialized medical centers. Capacity of the country's 25 hospitals rose from 7,900 beds in 1974 to 8,900 beds in 1975. A new Singapore General Hospital, complete with modern telecommunications equipment, was partially opened in 1976 and should be completed by 1982.

The current General Hospital will undergo major expansion and modernization. Teaching facilities including at least three CCTV systems will be incorporated. A 900-line PABX system will be installed and an expanded paging network is planned.

Additional Information

This Survey is one of a series based on market research reports prepared overseas for the Office of International Marketing. Other detailed marketing information on Singapore is available on a continuing basis from:

Country Marketing Manager—Singapore
Office of International Marketing
BIC/DIBA
U.S. Department of Commerce
Washington, D.C. 20230

A copy of the original research which this Country Market Survey summarizes is available at a cost of $10 from:

National Technical Information Service
U.S. Department of Commerce
Springfield, Virginia 22161
Sales desk telephone: (703) 557-4650

The report covers: (1) a detailed description of the national telecommunications network, (2) discussion of the market with special sections on products of particular interest to U.S. manufacturers, (3) descriptions of all major end-user sectors, (4) competitive situation, including U.S., third-country and domestic suppliers, (5) tariff rates, and (6) lists of potential purchasers, trade associations and publications.

Please request: "The Market for Communication Equipment and Systems: Singapore." DIB 76-05-508, September 1975.

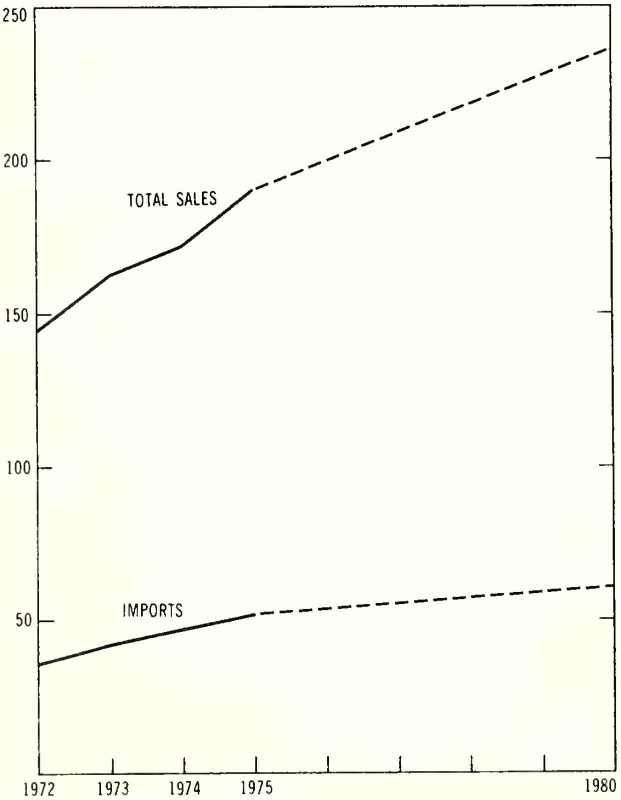
Information on the availability of published standards in Singapore may be obtained from the National Technical Information Service, Technical Help to Exporters, Springfield, Virginia 22161.

South Africa

The South African market for communications equipment has shown steady growth through the decade, in spite of a general business downturn in 1974 and 1975; by the latter year, sales of communications equipment had reached $190 million, up from their 1973 level of $162 million. The large part of these purchases were made from local suppliers, but as the market becomes more technologically advanced, demand for specialized equipment will bring increasing sales opportunities to foreign suppliers. A generally sound economy, favorable financial climate and heavy expenditures by public authorities and large private corporations to upgrade and re-equip their communications network could yield sales of over $235 million[1] by 1980. (See figure and table 1.)

South Africa: Communications equipment market
1972-75 projected, 1980

(millions of U.S. dollars)



Source: Bureau of International Commerce, Office of International Marketing research study; values based on official South African statistics and trade estimates

U.S. Sales Outlook

Almost three-quarters of the South African communications market is produced locally. Subsidiaries of major U.S. and European manufacturers, working under contract to the South African Post Office, dominate the industry. Imports supplied 27% of the total market in 1975, or $52 million, and should hold about the same market share in 1980, when their value is predicted to reach $60 million. (See table 2.) Purchases of American-made equipment were $3.4 million in 1974, accounting for approximately 7% of South Africa's total imports. (See table 3.) U.S. suppliers can expect to capture a larger share of the import market by emphasizing sales of high-grade, specialized componentry not manufactured domestically.

Strong demand should provide American manufacturers with good sales opportunities for the following communications equipment:

Transmission equipment/systems.—Of the $40-million transmission equipment market in 1974, 23% was imported. Although direct purchases from U.S. suppliers were less than 5% of the import market for the same year, an expanding market for transmission equipment, projected to reach $51 million by 1980, could substantially increase U.S. sales

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[1] All values are shown in U.S. dollars. Local currency data are converted at the following exchange rates: US$1=77.6 rand (1972), 69.4 rand (1973) and 69.9 rand (1974 and subsequent years).

South Africa—Selected Indicators

Population (1975):	**25.3 million**
GNP (1975):	**$33.7 billion**
No. of telephone lines (1972):	**1,007,779**
Number of computers (1974):	**1,000**
Number of modems (mid-1975):	**3,000**
Number of dedicated lines (mid-1975):	**2,000**

in this product category. Demand is expected to be strongest for: video baseband radio and other facilities, digital carrier multiplex, new equipment in coaxial systems, and related componentry (transistors, specialized integrated circuits, millimeter waveguides). Microwave transmission is very important in South Africa, and the Government will be extending its network at an expense of over $1.5 million annually to meet the needs of its television and satellite programs. Utilities and private companies also purchase microwave transmission equipment. Other segments of the telephone and telegraph market are carefully controlled by the South African Post Office, and offer small potential to U.S. companies. The development of private internal telephone systems will bring new markets to U.S. firms.

Data communications equipment.—The market for data communications equipment is forecast to more than double between 1975-80, reaching $18 million in the latter year. Sales of U.S. equipment in this product category were valued at $370,000 in 1974, accounting for 20% of South Africa's import needs.

A market for data systems and system components is expected to reach maturity during the coming 5 years. Between 1972-74, the South African computer population doubled to 1,000 and this figure should redouble in the next 3 to 4 years. Although switches, multiplexers, and data concentrators will largely be supplied through local subsidiaries of firms already in the market, the outlook for continued expansion of the import market is promising. Imports are anticipated to increase to $4 million in 1980. Sales of data communications equipment will expand further now that the Post Office has begun permitting privately-owned, switched-data networks to be established on lines leased from their office.

The use of modems is also expected to rise, particularly in the 600-1,200 bits per second (bps) asynchronous category. Higher speed units, which are currently used only between Pretoria and Port Elizabeth, should be increasingly sought by 1980. Modems equipped with fault-finding facilities and automated features are particularly in demand by South African end users. All modems linked to the public network must be leased from the Post Office which supplies machines of up to 9,600 bps capacity. The Post Office's chief supplier is STC.

Communications test equipment.—Sales of communications test equipment are projected to rise from their 1975 level of $1.6 million to $2 million in 1980. In 1974, U.S. manufacturers supplied just under 30% of this import market. The continuing rise in the level of imports is bringing increased demand for phase measuring devices, spectrum analysers, signal generators, microwave modulators, oscilloscopes of all ranges, cable fault and pulse amplifiers, and telephone test sets. All these instruments could be sold on the South African market by U.S. suppliers, but must be backed up by strong servicing and parts replacement guarantees. American equipment is already recognized for good design and reliable servicing.

Nonbroadcast radio and TV communications equipment. — Nonbroadcast radio and television equipment sales were $5 million in 1974 and are projected to increase to $9.7 million in 1980, of which $7.4 million will come from foreign manufacturers. U.S. suppliers hold a significant share of the import market in this product category; their sales

Table 1.—South Africa: Sales of communications eqiupment, 1972-75, projected 1980

(in millions of U.S. dollars)

	1972	1973	1974	1975	1980
Telephone and telegraph apparatus					
Central office exchanges	66.0	78.0	83.0	93.0	102.0
Private branch exchanges (PBX, PABX)	13.5	14.6	15.8	17.0	24.8
Transmission equipment/systems	37.0	38.8	40.0	42.0	51.0
Other[1]	19.5	20.3	21.2	22.0	26.7
Data communications equipment	3.9	4.6	5.6	7.2	18.0
Nonbroadcast radio and TV communications equipment					
Mobile radio, land	1.7	2.0	2.3	3.3	4.6
Mobile radio, marine	1.4	1.4	1.5	1.6	1.8
Paging systems	.6	.7	.8	1.1	2.1
Other mobile	.2	.3	.4	.5	.8
Closed circuit TV	—	—	—	—	.4
Microwave components[2]	.1	.2	.3	.4	.8
Communications test equipment[3]	1.0	1.2	1.4	1.6	2.0
Total	144.9	162.1	172.3	189.7	235.0

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[1] Central office equipment n.e.s. and subscriber/user premise equipment.

[2] Sold separately.

[3] For other than laboratory use.

Source: Bureau of International Commerce, Office of International Marketing research study; values based on official South African statistics and trade source estimates.

Table 2.—South Africa: Imports of communications equipment, 1972-75, projected 1980
(in millions of U.S. dollars)

	1972	1973	1974	1975	1980
Telephone and telegraph lines					
Central office exchanges, mechanical and electronic, voice:					
Small (less than 1,000 lines)	2.7	3.1	3.4	3.7	4.1
Medium (1,000-3,000 lines)	4.9	5.9	6.2	7.0	7.7
Large (over 3,000 lines)	8.9	10.5	11.1	12.5	13.7
Subtotal	16.5	19.5	20.7	23.2	25.5
Private branch exchanges, mechanical and electronic, voice:					
Systems 3-line through 80-line	1.4	1.6	1.6	1.8	2.1
Systems 81-line and over	2.2	2.4	2.7	2.9	3.4
Subtotal	3.6	4.0	4.3	4.7	5.5
Transmission equipment/systems					
Wire and cable	.2	.2	.2	.3	.2
Microwave	2.0	4.0	4.5	5.0	6.0
Multiplex	.7	1.0	1.5	2.0	2.5
Millimeter waveguide	.4	.4	.5	.5	1.0
Satellite	.8	1.5	2.5	1.8	.5
Subtotal	4.1	7.1	9.2	9.6	10.2
Other telephone and telegraph apparatus:					
Central office equipment	2.0	2.0	2.1	2.1	2.0
Subscriber/user premises equipment	2.9	3.1	3.2	3.4	3.3
Subtotal	4.9	5.1	5.3	5.5	5.3
Total, telephone and telegraph apparatus	29.1	35.7	39.5	43.0	46.5
Data communications equipment					
Switches	.1	.1	.1	.2	.2
Modems:					
50-900 bps	.3	.4	.4	.4	.9
901-1200 bps	.1	.1	.1	.1	.3
1201-9600	.2	.2	.2	.3	.5
Over 9600 bps	—	—	—	—	.1
Multiplexers	.4	.4	.5	.5	1.0
Data concentrators	.4	.4	.5	.5	1.0
Total, data communications equipment	1.5	1.6	1.8	2.0	4.0
Nonbroadcast radio and TV communications equip.					
Mobile radio, land:					
Transmitters (bay station)	.2	.2	.3	.4	.5
Receivers, vehicle	1.0	1.2	1.4	2.1	2.8
Receivers, portable	.1	.1	.2	.2	.3
Mobile radio, marine:					
Transmitters (bay station)	.5	.5	.5	.5	.6
Receivers	.5	.6	.6	.6	.7
Paging systems	.5	.6	.6	.8	1.6
Other mobile equipment	.3	.3	.4	.5	.6
Closed circuit TV	—	—	—	—	.3
Total, radio and TV communications equipment	3.1	3.5	4.0	5.1	7.4
Microwave components[1]					
RF power and low noise transistors	—	.1	.1	.1	.2
Traveling-wave tubes	—	—	—	.1	.1
Microwave integrated circuits	.1	.1	.1	.1	.2
Total, microwave components	.1	.2	.2	.3	.5
Communications test equipment[2]	1.0	1.2	1.5	1.6	2.0
Total, communications equipment	34.8	42.2	47.0	52.0	60.4

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[1] Sold separately to manufacturers.

[2] For other than laboratory use.

Source: South African Import Statistics, 1972, 1973; all other values based on official South African statistics and trade source estimates.

stood at $1.65 million or 41% of South Africa's import in 1974. As the number of vehicles using mobile radios grows at a projected 10% annually, U.S. suppliers can expect to find good sales opportunities for vehicle receivers; prime customers include the police force, Post Office, SARH and taxi companies. The outlook for sales of marine mobile radios and paging systems is also promising and open to innovative equipment. There are currently only eight closed circuit TV units in South Africa. Although Post Office demand is expected to be small for the present, the University of South Africa plans to install a CCTV system soon.

U.S. companies already active in the South African communications equipment market are: Hewlett-Packard, a significant supplier of test equipment; Motorola, mobile radio equipment; and Collins Radio Co. (owned by the Rockwell International Corporation), computer systems for data switching networks and transmission. Tektronix Inc. also participates in the market. The importer and manufacturer Standard Telephone and Cable (STC), though owned by ITT, is more closely tied to its U.K. parent company. Other U.K. affiliates include Pye Telecommunications, Marconi Instruments Lt., Marconi (Marine), Racal Ltd., and

Table 3.—South Africa: Imports of communications equipment by country of origin, 1974
(in thousands of U.S. dollars)

	Total	United States	United Kingdom	Germany	France	Netherlands	Italy	Other
Telephone and telegraph apparatus								
Central office exchanges, mechanical and electronic voice	20,750	40	9,000	10,800	200	400	—	310
Private branch exchanges, mechanical and electronic, voice	4,290	100	1,100	1,200	500	1,200	100	90
Transmission equipment systems	9,200	400	3,600	3,200	1,500	300	—	200
Other telephone and telegraph apparatus	5,290	300	2,200	2,200	—	200	—	390
Subtotal	39,530	840	15,900	17,400	2,200	2,100	100	990
Data communications equipment	1,830	370	650	650	100	—	—	60
Nonbroadcast radio and TV communications equipment	3,945	1,650	1,050	900	250	45	—	50
Microwave components[1]	225	110	60	40	15	—	—	—
Communications test equipment[2]	1,520	450	350	250	200	150	—	120
Total	47,050	3,420	18,010	19,240	2,765	2,295	100	1,220

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[1] Sold separately.

[2] For other than laboratory use.

Source: Bureau of International Commerce, Office of International Marketing research study; data based on official South African statistics and trade source estimates.

Cable & Wireless Co. Ltd. Siemens AG and AEG Telefunken are the two major German suppliers. Compagnie Generale d'Electricite (France), Philips Telecommunications Ltd. (Netherlands), Telettra Ltd. (Italy), and Autophon Ltd. (Switzerland) all supply the South African communications equipment market. British and German firms together accounted for 79% of imported communications equipment in 1974. European manufacturers are the major suppliers of telephone and telegraph apparatus, and sell a large portion of South Africa's VHF radio, marine radio, HF sideband, and some microwave equipment.

Import duty rates generally range between 5% and 15%, with some equipment being subject to as much as a 10% additional sales duty tax. As a rule, a foreign supplier is required to apply for an import permit, which may be denied if his product is already adequately provided by local manufacturers. Some preferential and most favored nation tariffs are in effect. The South African Government has initiated a 20% import deposit scheme as of August 2, 1976.

The Domestic Equipment Industry.—The South African communications equipment industry in 1975 comprised fewer than 12 manufacturing firms (as distinct from assembling agents), employing approximately 12,000 total. Production was $125 million in 1974; projections indicate production valued at $175 million in 1980. Local production is predominently controlled, however, by subsidiaries of foreign concerns (42%), which act as agents assembling equipment and handling repair and maintenance service. GEC (AEI) Henley, a subsidiary of the British company GEC, and Plessey (SA) Ltd., a U.K. subsidiary, each control market shares of 20%. Other local subsidiaries and their parent-companies include: Siemens (Siemens, Germany), 28% of the market; STC (SA) Ltd. (ITT, U.S.), 12%; Philips Telecommunications (Pty) (Netherlands), 6%; Fulmen (CGE, France) and AEG (Telefunken) Pty. Ltd. (AEG, Germany) are also represented. Among the South African-owned communications firms are United Electronics, Barlow Electronics, and C. J. Fuchs Ltd.

The Communications Network

The telecommunications network in South Africa is supervised and regulated by the Post Office. It closely follows British standards which are based on CCITT and CCIR regulations.

The South African telephone network has become outdated, and the federal Post Office is undertaking major reequipment programs. The Post Office is working through a selected number of local subsidiaries of U.S. and European firms. Among the projects these companies will undertake is a new system of electronic exchange switching, to be introduced in 1978, based on a modular, flexible, adaptable, and stored program-controlled (SPC) design. It will be used for local exchanges for about 2,000 to 20,000 subscribers and for trunk exchanges with up to 17,000 incoming and 17,000 outgoing lines. The existing trunk transmission system, with its overhead wire carriers, underground paired and coaxial cables, and microwave links, is already of a high standard.

Most towns in South Africa are served by only

Table 4.—South Africa: Projected sales distribution of communications equipment to end users, 1980[1]

(in percent)

		Government											
	Military	Federal[2]	Municipal	Local	Manufacturing	Retail	Banking & Ins.	Transportation[3]	Public utilities	Hospitals	Education	Mining & minerals explor.	Other
Telephone and telegraph apparatus	4	68	2	2	7	3	2	6	4	—	—	2	—
Central office exchanges	3	87	1	2	—	—	—	4	3	—	—	—	—
Private branch exchanges	7	32	11	14	15	4	3	6	4	—	1	2	1
Transmission equipment/systems	5	60	4	5	3	—	—	8	12	—	1	2	—
Other[4]	5	68	4	5	3	—	—	5	6	—	1	2	1
Data Communications equipment	8	62	2	2	14	1	2	2	3	—	1	2	1
Nonbroadcast radio and TV communications equipment	18	11	4	5	10	1	3	15	15	1	2	12	3
Mobile radio, land	16	16	3	3	7	—	2	15	18	—	4	14	2
Mobile radio, marine	24	8	5	5	5	—	—	30	18	—	—	—	5
Paging systems	9	10	6	9	18	5	9	10	12	5	—	6	1
Other mobile radio[5]	20	9	—	—	20	—	—	20	20	—	—	10	1
Closed circuit TV	—	—	—	—	25	—	—	25	20	5	5	20	—
Microwave components[6]	10	15	—	—	65	—	—	5	5	—	—	—	—
Communication test equipment[7]	6	33	—	2	20	—	—	20	15	—	—	4	—
Total	8	61	2	3	9	1	2	8	4	—	—	2	—

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[1] Figures represent sales to each end-user market as a percent of total sales of each type of equipment listed.

[2] Data for the South African Post Office is included here. Other government-controlled or regulated sectors excluded.

[3] Includes rail, marine (cargo and recreational), trucking concerns, taxis, etc. Air transport services excluded.

[4] Central office equipment n.e.s. and subscriber/user premise equipment.

[5] Excludes all air mobile nonbroadcast communications equipment.

[6] Sold separately.

[7] For other than laboratory use.

Source: Bureau of International Commerce, Office of International Marketing research study.

one telephone exchange. Only 10 areas have population sufficient to warrant multi-exchanges. In these cases, one exchange is selected to house the Data Test Center (DTC), and all data circuits, whether they lie within the multiexchange area or proceed out of the area, are routed through the DTC.

The South African telephone network offers service to 160 countries, including trunk dialing to Germany and the United Kingdom. Approximately 50% of the country's overseas traffic is with the United Kingdom. One hundred and eighteen channels to South America are available on the SATI, which has been in operation since 1969, providing radio telephone and telex services to that continent.

To meet the increasing demand for overseas communications, the government began contracting for its first national satellite Earth station in 1974. This link with Intelstat IVA will provide direct circuits to Europe, Africa and North and South America. A second antenna links South Africa with Southeast Asia, Japan, Australia and New Zealand. This system is planned to improve South Africa's international telecommunications network, expand television broadcasting (introduced in 1975) and provide an alternate communication system in the event of cable sabotage.

Of the open-wire carrier transmission systems in operation in 1974, 946 had 12 channels, 908 had 3, and 1,841 had single, rural channels. There were also over 25,000 channels on the microwave systems and carriers on paired coaxial cables.

The South African Post Office offers data transmission over automatic telephone and telex lines at speeds ranging from 50 to 4,800 bps. It leases both lines and modems. Leasing costs are high because of the great distances between communication points, and large users often cut their expenditures by operating higher speed, 4,800-bps lines and subdividing them by time-division multiplexing into four 1,200-bps subchannels.

There are presently 11 links making use of time-division multiplexing in various configurations. The equipment may consist of a separate modem and multiplexer, or these units may be combined to form a multi-port modem. The Post Office does not presently supply multiplexers or multi-port modems, nor does it permit owners of such equipment to sublease it. Only one leased international data circuit, established in 1974, is in service between Johannesburg and London at 4,800 bps, although a recent survey indicates that over 8,000 data terminals will be connected to transmission lines in South Africa by 1977.

The national telex network is a switched operation known as Gentex; it had 1,700 teleprinters in operation in 1974. This system is fully automated, with its main plant based in Johannesburg and eight regional exchanges. Direct dialing to 30 overseas countries is available, and the number of overseas calls is rising at a far more rapid rate than inland

Abbreviations

CCIR	**Consultative Committee on International Radio**
CCITT	**Consultative Committee on International Telephone and Telegraph**
ISCOR	**Iron and Steel Corporation**
ESCOM	**Electricity Supply Commission**
SARH	**South African Railways and Harbours**
SATI	**South Atlantic Submarine Cable**
STC	**Standard Telephone and Cable Company**

metered calls.

About 45% of telex subscribers make use of such attachments as automatic perforators and transmitters. These subscribers include tre South African Police, mining, industrial, and commercial concerns, the defense department, transport and public services, the press and hotels. So far, only one bank has made an effort to use the telex network for data capture and transmission.

Major Purchasers

Government. — The Government is South Africa's largest user of communications equipment. Purchases by all levels of government accounted for 76% of the total 1974 market or approximately $130.9 million. The Government is expected to maintain this market share, with communications equipment expenditures of $174 million in 1980. (See table 4.) Government is the major purchaser in all categories of equipment except microwave components; its purchasers in 1974 included: $125 million for telephone and telegraph apparatus; $4.5 million for data communications equipment; $2 million for nonbroadcast radio and TV communications equipment; and nearly $600,000 for communications test equipment.

The South African Post Office is projected to spend $235 million annually from 1975 until 1980 for equipment to modernize its telecommunications network; it anticipates expenditures of $1.4 billion for switching gear alone in the 10 years 1976-86, as it converts to the new SPC electronic exchange system. Municipal use of VHF radios, presently operated only for emergency services and internal communications, is expected to become more frequent. The South African Police and the municipally-operated Fire Services are particularly receptive to high-quality and cost-effective nonbroadcast radio equipment.

Manufacturing.—Projections indicate a continued demand for communications equipment by the manufacturing industry, whose purchases amounted to $13.8 million in 1974. South African manufacturers are major buyers of microwave components, accounting for nearly $200,000 of 1974 sales. Industrial purchases of microwave components are forecast to grow to over $500,000 in 1980. The manufacturing industry is also a major user of data communications and communications test equipment.

Transportation services. — Purchases of communications equipment by the transportation sector were valued at $12.1 million in 1974. The South African railway authority, SARH, operates its own communications system largely independent of the Post Office and follows a more flexible purchasing policy. With an annual budget of $21 million for telecommunications operating equipment from 1976-80, technologically innovative equipment is expected to be in constant demand by this agency.

Trade sources report that the transport sector's demand for coastal telecommunications equipment will grow at a 10% annual rate well beyond 1980.

Additional Information

This Survey is one of a series based on market research reports prepared overseas for the Office of International Marketing. Other detailed marketing information on South Africa is available on a continuing basis from:

Country Marketing Manager—South Africa
Office of International Marketing
BIC/DIBA
U.S. Department of Commerce
Washington, D.C. 20230

A copy of the original research which this Country Market Survey summarizes is available at a cost of $10 from:

National Technical Information Service
U.S. Department of Commerce
Springfield, Virginia 22161
Sales desk telephone: (703) 557-4650

The report covers: (1) a detailed description of the national telecommunications network, (2) discussion of the market with special sections on products of particular interest to U.S. manufacturers, (3) descriptions of all major end-user sectors, (4) competitive situation, including U.S., third-country and domestic suppliers, (5) tariff rates, and (6) lists of potential purchasers, trade associations and publications.

Please request: "The Market for Communications Equipment and Systems: South Africa." DIB 76-04-504, September 1975.

Information on the availability of published standards in South Africa may be obtained from the National Technical Information Service, Technical Help to Exporters, Springfield, Virginia 22161.

SARH plans to spend $329 million on improving commercial harbor facilities during the next 5 years, creating a demand for all types of communications equipment, including communications test equipment, nonbroadcast radio, and TV communications equipment.

Public utilities.—Sales of communications equipment to the public utilities were $6.9 million in 1974. Major users include the Electricity Supply Commission (ESCOM) and the Iron and Streel Corporation (ISCOR). Both organizations have large capital projects planned for the modernization and expansion of their operations. ESCOM has its own transmission system linking coastal areas to the large power stations, while ISCOR makes extensive use of the public telecommunications system, using not only the Post Office network, but also highly organized computer services, data transmission on the switched network and VHF radio links.

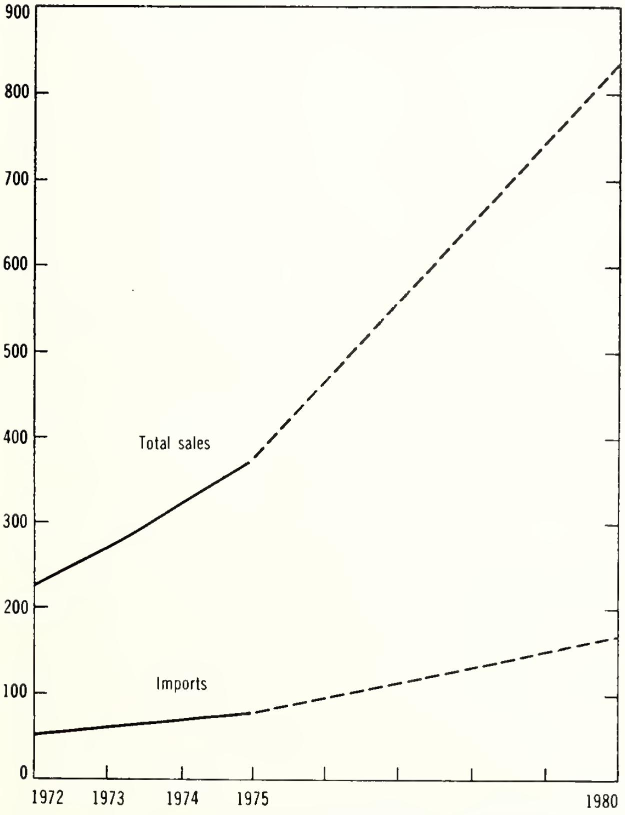
Other users.—PABX and telex service are already used extensively by the banking and insurance industries, whose needs are continuously expanding. Both are also expected to be important users of data communications equipment in the future. The mining industry is expected to increase usage of nonbroadcast radio and TV communications equipment, with some demand for closed circuit TV anticipated by 1980.

Spain

Spain is installing one of Europe's largest, most modern telephone networks, and the country's expenditures on telephone and other communications equipment have reflected this, rising from about $270 million[1] in 1973 to $375 million in 1975. (See figure and table 1.) The country's Fourth Development Plan of 1978-83 will bring heavy investment by CTNE, the privately-owned national telephone company, which will help push the market to over $834 million by 1980. Although much of this equipment is produced locally, the demand for more advanced telecommunications products promises a growth market potential for U.S. manufacturers.

Spain: Communications equipment market
1972-75, projected 1980

(in millions of U.S. dollars)



Source: Bureau of International Commerce, Office of International Marketing research study; values based on official Spanish statistics and trade source estimates.

U.S. Sales Outlook

Imports accounted for approximately 20% of the total Spanish communications equipment market in 1974, or $70.3 million. (See table 2.) Projections indicate a growth in imports to $170 million in 1980. Spain is practically self-sufficient in standard equipment. CTNE, the market's major utility, holds part-interest in several of the largest domestic companies, and places sizable orders of telephone equipment with them. Other categories of equipment often come from foreign suppliers.

In 1974, U.S. origin equipment provided 21%, or about $15 million, of communications equipment imports. Specialized test equipment, microwave components and especially data transmission equipment have been the most actively imported items. (See table 3.)

The following categories of communications equipment should offer the best sales prospects to American suppliers in Spain through 1980:

Data communications equipment. — The market for data communications equipment stood at $14.4 million in 1974 and is projected to reach $55 million by 1980. Spain imported 66% of its requirements or $9.6 million in data communications equipment in 1974. Imports are expected to account for over $36 million annually by the end of the decade. Over 90% of Spain's computer and terminal equip-

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[1] All values are shown in U.S. dollars. Local currency data are converted at the following exchange rates: US$1 = 64.47 pesetas (1972), 58.75 pesetas (1973), and 57.39 pesetas (1974 and subsequent years).

Spain—Selected Indicators

Population (1975):	**35.5 million**
GNP (1975):	**$59.3 billion**
Number of installed telephones (1974):	**7,042,968**
Number of main stations (1973):	**9,321**
Number of computers (1975):	**2,254**
Number of telex subscribers (1975):	**10,093**

ment is of American manufacture. This gives a decided edge to American producers of computer-related equipment. U.S. producers supplied 40% or $3.9 million of all imported data communications equipment in 1974.

In order to upgrade Spain's data transmission network, CTNE plans to purchase at least 100 concentrators by 1980 and to construct 3 computerized regional switching centers. Other purchasers of data transmission systems are the major banks, the national airline and the large commercial data processing centers. U.S. firms will find a growth market for modems. multiplexers, message switching equipment and data concentrators.

Nonbroadcast radio and TV communications equipment.—The Spanish market for nonbroadcast radio and TV communications equipment is forecast to advance from its 1974 level of $31.8 million to $83.5 million in 1980. Imports are anticipated to rise substantially, from $18 million to $41.6 million during the same period. U.S. manufacturers, who in 1974 supplied $4.2 million or 23% of imports, are expected to find excellent opportunities to sell compact radio, radio paging and CCTV equipment.

U.S. manufacturers are likely to find their most promising sales in the field of CCTV. In 1974, they supplied just under $1 million or 67% of all CCTV imports. Projections indicate that the market for CCTV systems will grow at about 20% annually through this decade. Sales opportunities will be greatest for bank security systems and for patient care monitoring in hospitals, where color and videotype equipment is in demand. As educatoinal funds are made available under the country's Fourth Development Plan, U.S. producers will find a highly favorable reception for "package deals" of CCTV equipment with easy-to-operate controls.

Marine mobile radios are in much demand in Spain, a country which has the world's third largest fishing fleet and ranks sixth in shipbuilding. To comply with international regulations, all such radios must operate on single sideband by 1982. Upgrading and refitting to this standard is expected to provide good sales opportunities for U.S. suppliers. Also in demand will be portable VHF and UHF radio transmitters, which the Spanish government is now permitting to private owners. Autotransceivers used in these same frequency ranges are being installed by construction and mining companies and for other industrial applications.

Subscriber/user premises equipment. — Sales of this equipment totaled $2.8 million in 1974, of which imports represented $1.3 million or nearly half of the market. U.S. firms received orders for $690,000 in subscriber/user premises equipment in 1974. Trade sources predict that U.S. firms will benefit from the increased demand for analog facsimile equipment. The high reputation of American electronic equipment gives U.S. manufacturers a decided competitive advantage, especially in equipment incorporating solid state electronics technology. Other products offering good sales potential for U.S. suppliers are high-speed teleprinters, automatic dialing, intercom, conferencing and picture phone equipment.

Communications test equipment.—Spain's communications test equipment market is predominantly supplied by imports. A lack of trained electronics technicians tends to inhibit sales of test equipment to laboratory and research organizations, but as Spanish communications systems become more technologically refined and new technicians are trained, demand for electronic test gear is forecast to rise

Table 1.—Spain: Sales of communications equipment, 1972-75, projected 1980

(in millions of U.S. dollars)

	1972	1973	1974	1975	1980
Telephone and telegraph apparatus					
Central office exchanges	114.1	136.9	164.3	192.0	417.3
Private branch exchanges	2.1	2.4	2.9	3.3	7.2
Transmission equipment/systems	39.9	46.6	54.4	63.5	138.1
Other	32.2	37.6	43.9	51.3	111.5
Data communications equipment	9.9	12.0	14.4	18.0	55.0
Nonbroadcast radio & TV communications equipment					
Mobile radio, land	5.1	6.0	7.0	8.2	17.7
Mobile radio, marine	8.2	9.5	11.1	13.0	28.2
Paging systems	.1	.1	.1	.1	.3
Other mobile	5.3	6.2	7.3	8.5	18.5
Closed circuit TV	3.7	4.9	6.3	7.6	18.8
Microwave components[1]	.9	1.1	1.2	1.3	2.3
Communications test equipment[2]	5.6	6.5	7.6	8.9	19.3
Total	227.1	269.8	320.5	375.7	834.2

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[1] Sold separately.

[2] For other than laboratory use.

Source: Bureau of International Commerce, Office of International Marketing research study; values based on official Spanish statistics and trade source estimates.

Table 2.—Spain: Imports of communications equipment, 1972-75, projected 1980
(in millions of U.S. dollars)

	1972	1973	1974	1975	1980
Telephone and telegraph apparatus					
Private branch exchanges, mechanical and electronic, voice					
3-40 line systems	.03	.03	.04	.05	.1
41-80 line and 81-200 line systems	.07	.08	.09	.10	.2
201-400 line, 401-900 line, and over 900 line systems	.12	.14	.16	.18	.4
Subtotal	.22	.25	.29	.33	.7
Transmission equipment/systems	5.36	6.16	7.09	8.15	16.4
Other telephone and telegraph apparatus	20.99	23.58	26.47	29.73	53.1
Total, telephone and telegraph apparatus	26.57	29.99	33.85	38.21	70.2
Data communications equipment					
Multiplexers 8 modems	2.62	3.28	4.10	5.50	15.7
Data concentrators 8 switches	2.08	4.20	5.52	6.53	21.0
Total, data communications equipment	4.70	7.48	9.62	12.03	36.7
Nonbroadcast radio & TV communications equipment					
Mobile radio, land	3.16	3.63	4.21	4.84	9.7
Mobile radio, marine	4.61	5.31	6.01	6.91	13.9
Paging systems	—	.07	.08	.09	.2
Other mobile equipment	4.72	5.42	6.29	7.24	14.5
Closed circuit TV	1.07	1.22	1.41	1.62	3.3
Total, radio & TV communications equipment	13.56	15.65	18.00	20.70	41.6
Microwave components [1]	.94	1.06	1.18	1.32	2.3
Communications test equipment [2]	5.58	6.52	7.61	8.89	19.3
Total, communications equipment	51.35	60.70	70.26	81.15	170.1

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[1] Sold separately to manufacturers.

[2] For other than laboratory use.

Source: Bureau of International Commerce, Office of International Marketing research study; values based on official Spanish statistics and trade source estimates.

in all sectors. Purchases of communications test equipment, valued at $7.6 million in 1974, are projected to reach $19.3 million by 1980. U.S. sales of equipment in this category currently account for about 10% of the market. American-made equipment in demand by Spanish technicians includes: oscilloscopes, trend meters and digital read-out meters.

Manufacturers from other countries, like those from the United States, have found that the most effective way to sell to the Spanish communications market is through local subsidiaries, the most important of which are listed below. Sweden, Germany and Italy are the principal competitors; Japan has only recently entered the market. Many sales are made by European subsidiaries of U.S. companies.

Spain has three kinds of tariff levels: general duty rates (10% to 31%), which apply to all countries except those belonging to the European Economic Community; reduced rates for EEC members (less than 1% to 26%); and import duty-added taxes (4% to 12%) applicable to all imports.

The Domestic Equipment Industry.—The domestic communications equipment industry, consisting of about 29 companies, employs approximately 33,000 people. Most major domestic manufacturers are affiliates of foreign companies, and many small producers also operate under foreign licenses. CTNE holds sizable (though not controlling) interest in Standard Electrica, Citesa, Intelsa, Telettra and Cables de Communicaciones, and these companies get most of the utility's equipment orders. Spanish manufacturers are important exporters of communications equipment; foreign sales will account for almost 8% of the industry's production in 1980.

The major domestic manufacturers in this market and their foreign affiliations include:

Standard Electrica, S.A. (ITT, U.S.)—centrals and telephone transmission equipment

Marconi Espanola, S.A. (ITT, U.S.)—small mobile radios and electronic instruments

Telettra Espanola, S.A. (Telettra, Italy)—microwave radio and transmission equipment

Compania Internacional de Telecommunicacion y Electronica (CITESA) (INTEL, ITT Switzerland)—telephones and PBX's

Industria de Telecomunicaciones, S.A. (INTEL-

Table 3.—Spain: Imports of communications equipment by country of origin, 1974
(in millions of U.S. dollars)

	Total	United States	Germany	Sweden	United Kingdom	France	Italy	Other
Telephone and telegraph apparatus								
Private branch exchanges	.29	.05	.02	.08	.01	.01	.04	.08
Transmission equipment/systems	7.09	1.16	1.96	.02	.05	.20	2.47	1.23
Other	26.47	4.85	1.90	7.22	1.33	1.23	2.99	6.95
Subtotal	33.85	6.06	3.88	7.32	1.39	1.44	5.50	8.26
Data communications equipment	9.62	3.85	1.81	.40	1.33	.93	.92	.38
Nonbroadcast radio and TV communications equipment								
Mobile radio, land	4.21[1]							
Mobile radio, marine	6.01[1]							
Paging systems	.08[1]							
Other mobile	6.29[1]							
Closed circuit TV	1.41[1]							
Subtotal	18.00	4.20	1.32	.18	1.09	.47	5.09	5.65
Microwave components	1.18	.04	.04	—	.21	.07	.12	.70
Communications test equipment	7.61	.80	1.10	.18	.51	.34	.18	4.50
Total	70.26	14.95	8.15	8.08	4.53	3.25	11.81	19.49

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[1] Breakdown by country not available.

Source: Bureau of International Commerce, Office of International Marketing research study; values based on official Spanish statistics and trade source estimates.

SA) (Ericsson, Sweden)—large automatic telephone and telegraph centrals

G.T.E. Electronica, S.A. (G.T.E. International, U.S.) — multiplexers and microwave transmission equipment

The Communications Network

The National Telephone Company of Spain (CTNE) is an autonomous organization operating under an exclusive nationwide concession granted by the Spanish Government over 50 years ago. This company is one of the most dynamic telephone companies in Europe; the number of telephones installed is growing at an average of 11.4% annually. The planned density in 1980 will be 30 telephones per 100 population. The national telephone network, centered in Madrid, is connected with the major cities using a combination of coaxial cable and microwave systems. The system is very largely automated now, and should be 99% so by 1979. The system's microwave network presently covers 31,000 miles with about 1,000 stations.

The 8,000 manual telephone exchanges in rural areas and small towns are gradually being phased out, and the systems incorporated into the automated nationwide network. Direct dialing service in the major cities and 50 provincial capitals is furnished to just over 88% of all installed telephones. In addition, the Madrid and Barcelona exchanges are computerized for direct, international dialing.

Spain's geographic location has been instrumental in its development as an international telecommunications center. Submarine cables connect it with stations throughout the Mediterranean, Middle East, Africa and South America. CTNE has most recently run direct cables to England, Italy, Scandinavia and Brazil.

The installation of a satellite tracking station in the Canary Islands during the U.S. Apollo space missions afforded Spanish experts the opportunity to study applied techniques of satellite tracking and HF digital transmission. Two earth stations are now operating in Spain, and a third is under construction. The main station at Buitrago (near Madrid) has three antennas—two for the Atlantic and one for the Indian Ocean Intelsat. International calls, satellite and cable combined, reached a total of 17 million in 1973; 70% of these calls were direct dial. The present ground stations have sufficient additional capacity, so that no new installations are foreseen in the next few years.

Spain has computerized data transmission switching centers in Madrid, Barcelona and Bilbao, and is constructing facilities at Valencia, Seville and Leon. Presently lines in use have a capability of 2,400 bits per second (bps). The computerized lines are capable of transmitting at 4,800 bps, and CTNE plans to transmit data at 9,600 bps by 1979 with the switched packet system.

The federal Post Office and Telecommunications Department operates the country's telegraph service, leasing approximately 80% of its lines from CTNE. In recent years, use of the telegraph service has declined while cost of operation has increased. Under the Third Development Plan, the Government in-

Table 4.—Spain: Projected sales distribution of communications equipment by end users, 1980[1]

(in percent)

	Government Military	Government Federal[2]	Manufacturing	Retail	Banking & Ins.	Transportation[3]	Public utilities[4]	Hospitals	Education	Mining & minerals explor.	Other
Telephone and telegraph apparatus											
Central office exchanges	—	5	—	—	—	—	95	—	—	—	—
Private branch exchanges	5	5	20	12	15	6	5	12	—	—	20
Transmission equipment/systems	7	13	—	—	—	5	75	—	—	—	—
Data communications equipment	4	6	16	13	19	5	30	2	2	—	3
Nonbroadcast radio and TV communications equipment[5]											
Mobile radio, land	30	40	—	—	—	20	10	—	—	—	—
Mobile radio, marine	5	—	—	—	—	90	—	—	—	—	5
Paging systems	—	—	45	15	15	—	—	20	—	5	—
Other mobile radio	25	40	—	—	—	—	20	—	—	15	—
Closed circuit TV	—	—	20	25	35	—	—	10	10	—	—
Microwave components[6]	—	—	100	—	—	—	—	—	—	—	—
Communications test equipment[7]	—	5	10	—	—	—	80	—	—	—	5
Total	3	8	5	2	2	5	73	1	—	—	1

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[1] Figures represent sales to each end-user market segment as a percent of total sales of each type of equipment listed.

[2] Expenditures for local and municipal government organizations are handled by and charged to the Federal Government.

[3] Includes rail, marine (cargo and recreational), trucking, taxis, etc. Air transport services excluded.

[4] Data for CTNE included here.

[5] Excludes all air mobile nonbroadcast communications equipment.

[6] Sold separately

[7] For other than laboratory use.

Source: Bureau of International Commerce, Office of International Marketing research study.

vested heavily to upgrade the system and most teleprinters in Spain are now electronic.

At the same time, telex usage has grown rapidly, and the Government intends to expand and improve the network under the Fourth Development Plan, replacing crossbar equipment with electronic or semi-electronic switching systems.

Major Purchasers

CTNE will continue to be Spain's largest single purchaser of communications equipment through 1980. (See table 4.) Other important buyers include Government agencies, manufacturing, banking and insurance sectors.

Public utilities.—CTNE employed 55,900 and had total earnings of $604 million in 1973. Together with the electric, gas and water companies, CTNE purchased 77% or $247 million of all communications equipment in Spain in 1974. Total sales to these companies are projected to reach $609 million in 1980. Investments by CTNE, valued at $649 million in 1973 and $951 million in 1974, are scheduled to increase 20% a year over the next 5 years, although some trade sources question whether this level of investment can be sustained.

In 1974, public utilities purchased 90% of all telephone and telegraph apparatus sold in Spain. In order to provide fully automatic telephone service by 1980, CTNE will continue its program to buy large and medium-size automatic central office exchange equipment. The electric companies are also regular purchasers of telephone systems for private transmission over high tension lines and should remain a steady market for this specialized instrumentation.

All public utilities are forecast to increasingly invest in compact, portable radio equipment for communications with field service crews and branch offices. Both vehicle-mounted VHF transceivers and pocket paging units should expect large sales increases.

Plans to create a packet transmission system connecting the country's data centers will increase demand for data communications equipment and communications test equipment. Utility purchases of these products are expected to reach about $17 mililon and $15 million respectively in 1980 and account for 30% and 80% of their markets.

Government. — Approximately $35 million or over 10% of all 1974 communications equipment purchases were made by the Spanish Government. Although the Government owns 38% of CTNE stock, it has no direct voice in its management or its purchase decisions.

Under the Third Development Plan, begun in 1972, Government agencies invested heavily in exchange and transmission equipment for telegraph and telex services. The Fourth Development Plan is projected to budget an even larger. amount for the modernization of these services.

Police, ambulance and firefighting services are already heavy users of mobile radio and are expected to increase their usage. The Spanish military is also forecast to be in the market for mobile land radio equipment. Because several U.S. military bases are located in Spain, most equipment used by the military is made to U.S. specifications.

Manufacturing. — In 1972, a total of 247,700 Spanish manufacuring firms employed 2,500,000 persons, and during the same year, gross industrial production was $18.5 billion. The worldwide recession, though lowering industrial growth projections, has not hampered a trend toward consolidation and expansion in the Spanish manufacturing sector that has brought considerable new industrial construction. These projects, which include a new Ford factory, a steel mill, and a large, multicompany refinery/petrochemical complex, are expected to take full advantage of a wide range of advanced communications systems.

The manufacturing sector purchased over $6 million in communications equipment in 1974, accounting for 2% of the total market, and is projected to increase these purchases to $42 million in 1980. New equipment will be required for PBX systems already in operation. Teleprinters, used instead of the more costly telex service, will also be in demand. According to CTNE projections, use of point-to-point communications for both voice and teleprint communications will increase about 20% annually over the next 5 years. Recent technological advances have made the use of selective calling/paging radio systems feasible. The manufacturing industry is expected to become a leader in the use of paging equipment.

Major Spanish manufacturers are planning to increase their use of data transmission and centralized computer systems. The market for modems, especially high-speed models, should be extremely favorable to U.S. firms. A growing market for multiplexers and advanced modems with split carriers is also expected to advance.

Banking and insurance.—The banking sector in Spain is divided among three groups: national, private commercial and industrial, and savings banks. In 1973, seven institutions held 61% of the $44 billion total assets for the commercial/industrial banking group. During the same year, total assets for savings banks were listed at $27.2 billion. Total income for the 69 insurance companies was estimated at $1.1 billion.

Purchases of communications equipment by this combined sector accounted for 2% of total sales and were valued at $6 million in 1974. Sales are forecast to reach $16.7 million in 1980. Both banking and insurance institutions use computers in their operations and are expected to install remote terminals in branch offices with increasing frequency. As new data transmission systems are introduced and existing systems updated, the banking sector is expected to purchase the latest data concentrators and packet switching equipment to maximize computer utilization. Insurance companies will continue to rely on point-to-point transmission systems using low speed modems.

CCTV security systems should see a greater demand in the future, although telephone line-connected alarm systems linking regional banks to police headquarters have been proposed by some as a more practical and less costly alternative. The planned installation of a joint telecommunications network, including as many as 50 teletype terminals, is being considered by Spain's three stock markets and the main offices of the principal banks.

Additional Information

This Survey is one of a series based on market research reports prepared overseas for the Office of International Marketing. Other detailed marketing information on Spain is available on a continuing basis from:

Country Marketing Manager—Spain
Office of International Marketing
BIC/DIBA
U.S. Department of Commerce
Washington, D.C. 20230

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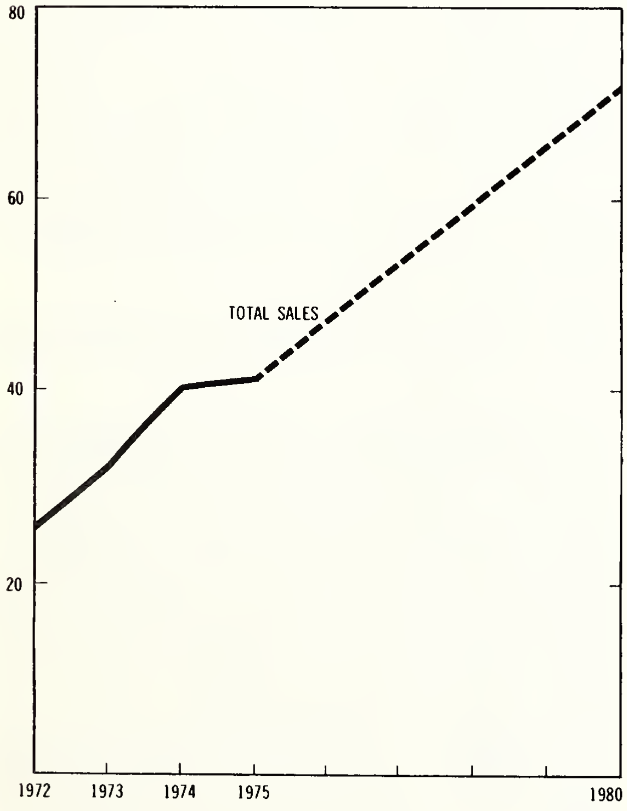
Please request: "The Market for Communication Equipment and Systems: Spain." DIB 76-05-506, September 1975.

Thailand

In the face of continuing political and economic uncertainties, the Thai Government is moving to strengthen its national telecommunications system through its Fourth Five-Year Development Plan of 1977-81. Rural development, improved security capabilities and a more attractive market for foreign investment are all goals requiring a more extensive and efficient communications system. Government purchases of communications equipment should continue to rise even though sales to private customers will remain stagnant. The market, valued at $42 million[1] in 1975, is predicted to reach $72 million by 1980. (See figure and table 1.)

Thailand: Communications equipment market 1972-75, projected 1980

(in millions of U.S. dollars)



Source: Bureau of International Commerce, Office of International Marketing research study; values based on official Thai statistics and trade estimates.

U.S. Sales Outlook

Most communications equipment used in Thailand is imported. 1974 imports of communications equipment totaled $19.2 million, of which approximately 65% was supplied by U.S. manufacturers. (See tables 2 and 3.) Demand for communcations equipment is expected to raise imports to nearly $60 million in 1980, with imports from U.S. producers approaching $40 million.

The United States is generally regarded in Thailand as the world leader in new technology and in high-quality, reliable equipment. In past years, the Thai Government has depended heavily on U.S. military and U.S. Agency for International Development assistance, and as a result, U.S. products have a strong advantage over foreign competitors. High prices, inadequate post-sales service and lack of attractive credit terms can hinder the sale of U.S.-made goods. In the future, technical specifications and financing are expected to be the most important factors in purchase decisions and may further improve the standing of U.S. firms, particularly those offering competitive credit terms.

Leading U.S. suppliers active in the Thai communications equipment market include: Motorola (portable radios), Collins (microwave and multiplex equipment), GTE (Earth stations and microwave), Hewlett-Packard (test equipment), Teletype (teleprinters.) ITT (telephone exchanges and subsets) Air Signal (paging systems), and IBM and ICC (modems). Some multinationals, such as ITT and GTE, supply equipment from their European factories.

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[1] All values are shown in U.S. dollars. Local currency data are converted at the following exchange rates: US $1.00=20.80 baht (1972); 20.40 baht (1973); and 20.00 baht (1974 and subsequent years).

Equipment offering the best sales prospects to American firms is discussed below:

Telephone and telegraph apparatus.—Sales of transmission equipment are expected to increase from $6.1 million in 1974 to $10 million by 1980. The Telephone Organization of Thailand (TOT) alone planned to invest approximately $18 million in 1976 for transmission equipment. TOT's purchases are expected to decline each year after that to $9 million in 1977, $7 million the following year and then $5 million, as the company completes its planned expansion. Purchases will increase again after 1980 as new expansion projects are undertaken. Most of the telecommunications transmission equipment used in Thailand is microwave, and $30 million was earmarked for microwave links and PCM equipment for interexchange communications in TOT's 1972-79 Expansion Plan. In 1974, 43%, or $774,000, of Thailand's imported transmission equipment originated in the United States.

Table 1.—Thailand: Market for communications equipment, 1972-75, projected 1980

(in millions of U.S. dollars)

	1972	1973	1974	1975	1980
Telephone and telegraph apparatus					
Central office exchanges	5.8	7.9	8.5	8.9	15.0
Private branch exchanges	1.0	1.3	1.8	1.8	3.1
Transmission equipment/systems	2.1	3.8	5.6	6.1	10.0
Other[1]	3.6	6.3	7.8	4.7	8.0
Data communications equipment	.2	.1	.4	.2	.3
Nonbroadcast radio and TV communications equipment					
Mobile radio, land	.5	.7	1.0	1.1	1.9
Mobile radio, marine	—	—	.1	—	—
Paging systems	—	—	—	—	.1
Other mobile radio	3.3	3.9	5.4	7.7	13.6
Closed circuit TV	2.1	1.1	.7	.3	.6
Microwave components[2]	1.0	1.1	1.4	1.7	2.9
Communications test equipment[3]	6.4	6.2	7.8	9.2	16.2
Total	26.0	32.4	40.5	41.7	71.7

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[1] Central office equipment n.e.s. and subscriber/user premises equipment.

[2] Sold separately.

[3] For other than laboratory use.

Source: Bureau of International Commerce, Office of International Marketing research study; values based on official Thai statistics and trade source estimates.

Table 2.—Thailand: Imports of communications equipment, 1972-75, projected 1980[1]

(in thousands of U.S. dollars)

	1972	1973	1974	1975	1980
Telephone and telegraph apparatus					
Central office exchanges	1,464	3,627	1,626	4,631	8,470
Private branch exchanges	451	605	812	824	1,750
Transmission equipment systems	359	1,001	1,783	2,505	6,000
Other[2]	1,627	2,143	1,973	2,315	4,800
Subtotal	3,901	7,376	6,194	10,275	21,020
Data communications equipment	49	11	58	32	150
Nonbroadcast radio and TV communications equipment					
Mobile radio, land	179	330	510	540	1,200
Mobile radio, marine	5	7	10	4	20
Paging systems	4	7	8	10	25
Other mobile equipment	433	940	1,222	1,638	3,500
Closed circuit TV	1,031	531	337	100	270
Subtotal	1,652	1,815	2,087	2,292	5,015
Microwave components[3]	227	346	314	377	1,000
Communications test equipment[4]	2,106	2,014	2,576	3,010	6,000
Total	7,935	11,562	11,229	15,986	33,185

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[1] Figures do not include shipments imported for military use.

[2] Includes central office equipment n.e.s. and subscriber/user premises equipment.

[3] Sold separately.

[4] For other than laboratory use.

Source: Bureau of International Commerce, Office of International Marketing research study; values based on official Thai statistics and trade source estimates.

Nonbroadcast radio and TV communications equipment.—The Thai market for land mobile radio is forecast to reach $1.9 million in 1980, a rise of 73% over the 1974 level. In 1974, United States manufacturers provided all ($510,000) of Thailand's imported land mobile radios; major suppliers were Motorola, Hallicrafters, and R.F. Communications. Spare parts supply and servicing by U.S. firms and their agents are considered good, but prices of U.S.-origin land mobile radios have been significantly higher than those of Japanese origin.

The market for other mobile radio equipment, such as telephone transceivers and mobile telephone systems, is projected to reach $13.6 million in 1980, a dramatic increase from the 1974 market of $5.4 million. Mobile VHF transceivers are the most salable equipment in this category, for which major customers are Telecommunications for Mass Media

Table 3.—Thailand: Imports of communications equipment by country of origin, 1974[1]

(in thousands of U.S. dollars)

	Totals	United States	Japan	Sweden	Italy[2]	Germany	Others[3]
Telephone and telegraph apparatus							
Central office exchanges	1,626	—	609	619	—	—	398
Private branch exchanges	812	32	161	268	28	102	221
Transmission equipment/systems	1,783	774	263	29	645	4	68
Other[4]	1,973	149	1,029	95	376	102	222
Data communications equipment	58	58	—	—	—	—	—
Nonbroadcast radio and TV communications equipment							
Mobile radio, land	510	510	—	—	—	—	—
Mobile radio, marine	10	2	4	—	—	—	4
Paging systems	8	8	—	—	—	—	—
Other mobile equipment	1,222	1,097	3	—	—	—	122
Closed circuit TV	337	—	191	—	—	—	146
Microwave components[5]	314	166	—	—	—	94	54
Communications test equipment[6]	2,576	1,321	517	373	19	88	258
Totals	11,229	4,117	2,777	1,384	1,068	390	1,493

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[1] Excludes imports for military use.

[2] In 1974 an Italian firm, Telettra, sold around 700,000 dollars of microwave transmission equipment to the Aeronautical Radio of Thailand for use at Don Muang Airport, making Italy's total sales unusually high that year.

[3] Including Belgium, the United Kingdom, Spain, Republic of China and Australia.

[4] Includes central office equipment n.e.s. and subscriber/user premises equipment.

[5] Sold separately.

[6] For other than laboratory use.

Source: Bureau of International Commerce, Office of International Marketing research study; values based on official Thai statistics and trade source estimates.

of Thailand, Telcom Company, the military organizations and some local businesses. TOT's Subscriber Trunk Dialing System, planned to become operational in 1979, will create greater demand for improved mobile telephone systems. The United States supplied 90%, or $1.1 million, of the country's imports of this equipment in 1974.

Closed circuit TV equipment, widely used as a training aid in the educational and industrial areas, is supplied primarily by Sony of Japan and Philips of the Netherlands. U.S. manufactured CCTV equipment has not entered the Thai market, but is considered to have good sales potential in the future.

Microwave components.—The market for microwave components is expected to more than double from 1974 through 1980, reaching about $3 million; traveling-wave tubes comprise about one-fourth of the imported components. U.S. manufacturers, such as Collins and GTE, provided more than half ($166,000) of Thailand's imports of these components in 1974. The TOT and the Post and Telegraph Department, which operates telegraph, telex and overseas communications, are the chief users of microwave components. Demand is forecast to increase significantly after the completion of the TOT's Long Distance Expansion Project in 1979. The Ministry of Interior will also purchase microwave components for its planned integrated telecommunications network.

Communications test equipment.—Sales of test equipment stood at $7.8 million in 1974 and are projected to reach $16.2 million in 1980. Communications test equipment purchased in Thailand includes: Volt-ohmmeters, spectrum analyzers, signal and sweep generators, frequency counters, oscillators, oscilloscopes, telephone test sets, and RF output power, field intensity and antenna-pattern measuring equipment. In 1974, American companies, such as Hewlett-Packard, Tektronix, Motorola and Simpson Electric, supplied more than half ($1.3 million) of Thailand's imported communications test equipment.

Import duties on foreign communications equipment range from 5% on complete telephone and radio sets to 80% on color television receivers. A business tax of 7% to 33% (calculated on an arbitrary profit determination) and a municipal tax (10% of the business tax) are added to the import duty.

Major suppliers.—Japanese companies obtain about 60% of the market for central exchange equipment, and that share is expected to increase annually. Japanese products are price competitive, and agents from that country use aggressive marketing techniques. Major Japanese suppliers in the communications field and their products include:

Telephone and telegraph apparatus	Nippon Electric Company (NEC)
Private branch exchange	Oki, Nitsuko, Matsushita, Iwatsu Electric
Nonbroadcast radio	Standard Radio, Furuno Electric
Closed circuit TV	Sony, Matsushita
Test equipment	Sanwa Electric Instrument, Anritsu

German firms sell primarily microwave transceiver equipment, PBX, and test equipment. Principal suppliers include:

Teleprinters	Siemens
Private branch exchanges	Siemens
Microwave	Standard Electric Lorenz (SEL)
Test equipment	Siemens, Wandel Goltermann, Robert Bosch GmbH Fernsehanlagen, Universal, Elima

Swedish-origin telecommunications equipment consists primarily of telephone and telegraph exchanges. Ericsson has been Thailand's major source of PBX and telegraph exchanges, but is now second to Japanese manufacturers.

Domestic Equipment Industry—Three Thai firms produce communications equipment: (1) ITT Thailand Ltd., employing approximately 60 persons, produced 7,000 telephone sets monthly in 1975; (2) Elcom Research (a licensee of E.F. Johnson of the United States), employing some 100 persons, produces amplifiers, flash units, HF and VHF transceivers; and (3) Thep Electronics Ltd., employing only 18, presently produces VHF transceivers, primarily for military use, and plans to manufacture UHF and microwave equipment in the future.

Communications Network

Thailand's domestic telephone network is operated by the Telephone Organization of Thailand (TOT), a semi-independent government utility. International telephone, telegraph and telex services are the responsibility of the Post and Telegraph Department (P&T), a division of the Ministry of Communications. Telephone service is much better in the Bangkok area than the provinces, with a density of 44 instruments per 1,000 inhabitants, compared to 1.4 per 1,000. The capital is served by 24 central exchanges carrying 188,580 lines; the provinces have 97 exchanges with 58,790 lines.

Although the TOT considers Bangkok's automatic crossbar system sufficient for present needs, it nevertheless is considering installation of one electronic exchange as a pilot project. As part of its new Subscriber Trunk Dialing System, the TOT will convert the 34 provincial manual exchanges to automatic by 1979. Both overhead and underground cable are presently utilized for local transmission; long-distance transmission is accomplished by microwave, UHF, VHF, troposcatter, and cable networks. TOT's 1972-79 Expansion Project calls for increased use of microwave. Long-distance toll service within the country is carried through 121 exchanges with 809 channels, and service with Malaysia and Laos through 19 channels.

The Ministry of Interior operates a separate 300-line telephone system for government use at its Telecommunications Center. A plan now under consideration would standardize all current systems under the Ministry in order to facilitate communication and reduce costs of replacement and servicing. The Local Administration Department of the Ministry of Interior also operates a series of telephone networks at the provincial level; if it is given the go-ahead to expand these to the district level, it will need equipment to supply 500 district capitals.

The international exchange is connected to the TOT's domestic exchanges to enable telephone subscribers to call overseas from their residences. Ericsson of Sweden is now building a new automatic crossbar exchange with a 300-line capacity to replace the existing 50-line exchange. International transmission is primarily via satellite; HF radio use is minimal. Channels for international telephone calls total 66, of which 56 connect with 10 overseas locations via the Pacific Ocean satellite. The remainder connect with the Indian Ocean satelilte and seven overseas locations. An additional Earth station of 24 to 60 channel capacity is planned to be constructed in the southern part of Thailand in 1974, also providing connections with the Indian Ocean satellite.

Telegraphic transmission equipment is installed in 538 post offices throughout the Kingdom. Teleprinters, located in 15% of the nation's post offices, are connected with the General Post Office in Bangkok by direct P&T cables, leased TOT channels (on the north and south trunk routes), and HF radio. Teleprinters must operate up to 50-baud. The torn tape system is presently used for sorting telegrams for distribution, but a computerized system, the Automatic Message Switching Center, is expected to be built shortly. Thirty microwave channels connected to the two Earth stations provide international transmission via the Pacific and Indian Ocean satellites.

P&T operates six step-by-step telex exchanges throughout Thailand. Three of the telex centers are connected with a main A-type 300-channel con-

Table 4.—Thailand: Projected sales distribution of communications equipment by end users, 1980[1]

	Government									
	Federal[2]	Military	Police	Manufacturing	Retail	Oil and Mineral exploration	Banking & Insurance	Transportation Services[3]	Hospitals	Other
Telephone and telegraph apparatus										
Central office exchanges	90	5	—	—	—	—	—	—	—	5
Private branch exchanges	1	10	5	20	30	—	10	1	1	22
Transmission equipment/systems	70	20	—	—	—	—	—	—	—	10
Other[4]	60	10	1	1	2	—	2	2	1	21
Data communications equipment	10	10	5	35	—	—	30	5	—	5
Nonbroadcast radio and TV communications equipment										
Mobile radio, land	—	50	15	5	1	3	—	1	—	25
Mobile radio, marine	—	25	5	—	—	—	—	—	—	70
Paging systems	—	—	—	—	—	—	—	—	5	95
Other mobile radios[5]	5	30	35	—	—	—	—	—	—	30
Closed circuit TV	—	15	5	10	35	1	5	—	5	24
Microwave components[6]	65	20	—	5	—	—	—	—	—	10
Communications test equipment[7]	50	20	5	15	—	—	—	—	—	10

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[1] Figures represent sales to each end-user market segment as a percent of total sales of each type of equipment listed.

[2] Data for TOT and P&T are included here.

[3] Includes rail, marine (cargo and recreational), trucking, taxis, etc. Air transport services excluded.

[4] Central office equipment n.e.s. and subscriber/user premise equipment.

[5] Excludes all air mobile nonbroadcast communications equipment.

[6] Sold separately.

[7] For other than laboratory use.

Source: Bureau of International Commerce, Office of International marketing research study.

centrator linked directly to the International Telex Transit Exchange in Bangkok. The domestic telex system is equipped with 6-unit code teleprinters which can print both in Thai and English by means of combined Thai-English keyboards. Code converters connect with the International Telex Transit Exchange which uses a 5-unit code system. International telex transmission operates over a voice frequency telegraph type system transmitting on 24 channels of telex per one voice grade of microwave. Over 600 subscribers use the domestic telex service, almost all of them in Bangkok; 52 users, mainly banks and airlines, subscribe to the international service.

Besides the P&T system, another telex system is used by the Central Telecommunications Center and its departments for communicating with 30 of the country's provinces. An expansion of 33 provinces is expected to be completed in 1977. All Thailand's telex exchanges are the automatic crossbar type.

PBXs and PABXs are of the manual step-by-step, automatic step-by-step, and automatic crossbar type; no electronic PBX or PABX units have been installed in Thailand. A market exists for manual PBXs for use in hotels and other service organizations. However, minor modification of dialing speed must be made to U.S.-origin equipment to make it compatable with the TOT's system. Trade sources indicate that the best sales prospects for U.S. suppliers are advanced electronic PBXs.

The Thai telecommunications and radio systems are based on CCITT and CCIR standards. No organization in Thailand sets or monitors technical standards for telecommunications usage. Each government organization hires its own engineers to prepare technical specifications for equipment. The TOT supervises the installation of all PABX, PBX, and other equipment connecting to the telephone system. P&T allocates all radio frequencies and operates shore stations. Firms must obtain approval from the P&T prior to importing or producing any radio equipment.

In 1970, P&T established a state-owned company, Telecommunications for Mass Media of Thailand, to manage privately-owned paging and radio telephone service. The company now has 220 subscribers, all businessmen. VHF equipment is used for the paging

Abbreviations

CCIR	**Consultative Committee on International Radio**
CCITT	**Consultative Committee on International Telephone and Telegraph**
EGAT	**Electricity Generating Authority of Thailand**
P&T	**Post and Telegraph Department**
RTF	**Royal Thai Forces**
TOT	**Telephone Organization of Thailand**

Thailand—Selected Indicators

Population (1975):	42,124,000
GNP (1975):	$14.9 billion
Number of installed telephones (1975):	
Bangkok	213,380
Provincial areas	44,477
Number of central office exchanges (end 1974):	
Bangkok	24
Provincial areas	97
Number of telex subscribers (1975):	622

system and UHF equipment for the radiotelephone network.

Major Purchasers

Telephone Organization of Thailand.—The TOT is a state-owned enterprise of over 8,500 employees and with an annual operating budget of approximately $116 million. Previously a division of the P&T, TOT now reports directly to the Ministry of Communications. Nearly 70% of telephone and telegraph sales are now accounted for by TOT. (See table 4.) The 1972-79 TOT Telephone Expansion Project, the most ambitious in the history of Thailand, is expected to establish 52 new exchanges with 310,000 lines, as well as extensive supportive equipment. Plans also call for increasing the number of long-distance circuits from the present 1,067 to 6,303. When this project is completed, subscribers will be able to dial directly to any point in the network. About half of the anticipated $265-$279 million budget will be obtained from loans from international organizations, and the remainder from TOT's own resources and bond issues.

Post and Telegraph Department.—The P&T has 14,000 employees, and unlike TOT, falls under the direct control of the Ministry of Communications. P&T controls and allocates telegraph, telex, overseas telephone calls and radio frequencies. The P&T relies on an annual RTG budget of about $32 million. The purchase of mobile Earth satellite equipment for connection with the Indian Ocean satellite is scheduled for the near future.

Military.—The Royal Thai Forces (RTF), with 211,000 personnel, are second only to TOT in usage of communications equipment. In the past the military procurred all equipment through local commercial agents, but the RTF now are considering establishing their own purchasing offices abroad to deal directly with manufacturers. The RTF communications network is being integrated into a single system for all military organizations, centered at central headquarters in Bangkok. The proposed system is divided into four geographical areas—the central, north, northeast, and south; the central area has already reached 50% completion.

The RTF utilize wideband microwave equipment, UHF/VHF line-of-sight and troposheric scattering equipment, telephone and teletype cable, and data circuits. Telephone exchanges at some army camps are being replaced by new crossbar equipment from ITT. Electronic exchanges will also be employed, but exchanges for tactical use will continue to be manual. The military uses a single point-to-point teleprinter network connected with telegraph terminals. Most teletype machines are supplied by NEC, Siemens, and SEL (ITT). VHF- and UHF-band radios are used for tactical relay equipment.

The RTF are planning to assemble some equipment from imported components and will soon be seeking foreign licensors or investors. The Royal Thai Army recently awarded a $700,000 contract to

Additional Information

This Survey is one of a series based on market research reports prepared overseas for the Office of International Marketing. Other detailed marketing information on Thailand is available on a continuing basis from:

Country Marketing Manager-Thailand
Office of International Marketing
BIC/DIBA
U.S. Department of Commerce
Washington, D.C. 20230

A copy of the original research which this Country Market Survey summarizes is available at a cost of $10 from:

National Technical Information Service
U.S. Department of Commerce
Springfield, Virginia 22161
Sales desk telephone: (703) 557-4650

The report covers: (1) a detailed description of the national telecommunications network, (2) discussion of the market with special sections on products of particular interest to U.S. manufacturers, (3) descriptions of all major end-user sectors, (4) competitive situation, including U.S., third-country and domestic suppliers, (5) tariff rates, and (6) lists of potential purchasers, trade associations and publications. Please request: "The Market for Communication Equipment and Systems: Thailand." DIB 76-02-017, January 1976.

Information on the availability of published standards in Thailand may be obtained from the National Technical Information Service, Technical Help to Exporters, Springfiled, Virginia 22161.

the Israeli-U.S. firm, Tadiran, to supply materials for radio receivers.

Ministry of Interior.—Although the Telecommunications Center of the Ministry of Interior is presently quite small, the Ministry intends to eventually control the extensive telecommunications networks of the Police, Local Administration and Public Welfare Departments and the Accelerated Rural Development Office. When this is accomplished, the Ministry of Interior will be one of the most important end users of telecommunications equipment in Thailand. This plan will probably take at least 5 years to implement once the go-ahead is given. Presently, the Telecommunications Center uses the domestic telex network, a separate telephone system and single sideband radios connecting government units in provincial areas.

The Thai Police Department is the largest government organization at the departmental level. HF, VHF and UHF transceivers and walkie-talkies are utilized; the last is the largest single item in the police department's communications budget. Equipment predicted to be in demand through 1979 are: 1,400 VHF 3-watt walkie-talkies, 2,500 VHF 5- to 10-watt portable transceivers, 340 VHF 100-watt fixed-base transceivers, 500 VHF 40-watt mobile transceivers, 1,500 HF 5-watt portable transceivers, and 200 HF fixed-base 150-watt transceivers.

Public utilities.—The Electricity Generating Authority of Thailand (EGAT), a large, well-organized state enterprise of more than 11,700 employees, enjoyed a net profit in 1974 of approximately $24.5 million. EGAT uses HF, VHF, and UHF transceivers installed at its generating plants and substations throughout the country. Power lines, utilizing high-tension cable, are also used for communications transmission. Data communications equipment is employed to feed information from stations to EGAT's computer center in Bangkok to control power generation levels. EGAT is in the process of buying UHF equipment to upgrade its present network and hopes to install a microwave system soon.

United Kingdom

The United Kingdom's communications equipment market fluctuated around $1 billion[1] a year during the first half of the 1970s, declining slightly in 1975. Sales are expected to begin climbing again in 1977 with the anticipated resurgence of the United Kingdom economy and reach $1.4 billion in 1980. The government-sponsored Post Office Corporation, which accounts for more than three-fourths of equipment purchases, has been forced by a combination of inflation, price controls, and government directives to postpone many planned expenditures. Nonetheless, the Corporation still hopes to increase its subscribership at least 60% by the early 1980s, install a new electronic exchange system, and extend telex, data communications, and satellite transmission capability.

U.S. Sales Outlook

United Kingdom consumers imported communications equipment valued at $176.9 million in 1974. Import expenditures are expected to increase well over 10% annually to more than $308 million by 1980. (See table 1.) U.S. manufacturers supplied 25% of communications equipment in 1974 (see table 2) and led foreign competitors in the following product categories:

- Telephone instruments
- Ground-based radio receivers and transmitters
- Shipborne receivers
- Electrical measuring and checking apparatus
- Magnetrons
- Traveling-wave tubes

American-made products are preferred for their reliability, technological sophistication and uniqueness. Cost is an important factor in the United Kingdom at this time. High sales are expected for the following American-made goods over the next 5 years:

- Fiber-optic components and subsystems
- Advanced telegraph systems
- Random-access memories, high-density and high-speed CCTV systems
- HF microwave components (particularly solid state, high-power, at UHF and microwave frequencies)
- Decorator-type telephone handsets
- Data multiplex systems

U.S. manufacturers find their strongest competition from British subsidiaries of American firms. The major third-country competition comes from EEC-country producers whose predominant advantage is membership in an essentially free-trade coalition.

No trade restrictions other than import duties ranging from 6.6% to 18.2% affect sales of U.S.-made communications equipment. However, in the face of mounting unemployment, the British trade unions are pressing the Government to limit the imports of certain goods, which may extend to electronic equipment.

Domestic Equipment Industry.—The United Kingdom has about 70 communications equipment manufacturers of more than 25 workers, with a total labor force of 90,000. Combined production reached $973 million in 1974 and is projected to reach $1.62 billion in 1980. (See table 3.) Representative manufacturers and their product lines are shown below:

Full range of equipment (Main suppliers to the Post Office):
The Plessey Co. Ltd.
The General Electric Co. Ltd. (unrelated to the U.S. firm)
Standard Telephones & Cables Ltd. (subsidiary of International Telephone and Telegraph Corporation, United States)

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[1] All values are shown in U.S. dollars. Local currency data are converted at the following exchange rates: US$1 = 0.400 Pound (1972), 0.408 Pound (1973), and 0.430 Pound (1974 and subsequent years).

United Kingdom—Selected Indicators

Population (1975):	**56.1 million**
GNP (1975):	**$163 billion**
Installed telephones (1974):	**19 million**
Number of computers (1975):	**9,300**

Pye TMC Ltd. and other subsidiaries of Philips Nederland NV, Netherlands

All product categories except transmission equipment:
- Ultra Electric Holdings Ltd.
- Thomson-CSF Ltd. (subsidiary of Thomson-CSF, France)

Electrical & Musical Instruments Ltd.

Data communications equipment:
- Exchange Telegraph Co., Ltd.
- Data Dynamics Ltd.
- The Solartron Electronic Group Ltd. (subsidiary of Heath/Schlumberger, United States)
- Burroughs Machines Ltd. (subsidiary of Burroughs Corporation, United States)
- Analog Devices Ltd. (subsidiary of Analog Devices Inc., United States)
- Bell & Howell, Electronics Division (subsidiary of Bell & Howell Co., United States)
- Digital Equipment Corporation Ltd. (subsidiary of Digital Equipment Corporation, United States)
- Link-Miles Ltd. (subsidiary of The Singer Company, United States)
- Honeywell Ltd. (subsidiary of Honeywell Inc., United States)

Mobile Radio and CCTV:
- Kelvin Hughes Division, Smith & Sons
- Bantex Ltd.
- C & S Antennas Ltd.
- Rank-Pullin Controls
- Mosley Electronics Ltd.
- Storno Ltd. (subsidiary of Storno A/S, Denmark)
- Siemens Ltd. (subsidiary of Siemens AG, Germany)

Microwave Components:
- Andrew Antenna Systems (subsidiary of Andrew Corporation, United States)
- Litton Precision Products International Inc. (subsidiary of Litton Industries, United States)
- AEG-Telefunken (UK) Ltd. (subsidiary of AEG-Telefunken, Germany)

Communications Test Equipment:
- Hewlett-Packard (Scotland) Ltd. (subsidiary of Hewlett-Packard, United States)
- Teltronix UK Ltd. (subsidiary of Tektronix Inc., United States)
- Danbridge (UK) Ltd. (subsidiary of AS Danbridge, Denmark)

The Post Office procures all of its equipment from British-based companies, whether foreign or domestically owned. These manufacturers constitute a substantial market for imported components, especially transistors and microwave equipment. Particular interest has been shown recently in such advanced items as CATT triodes to simplify microwave power amplifiers.

The Communications Network

The Post Office Corporation provides all telephone and telegraph services (with one minor exception), as well as data and facsimile transmission, and interurban conference television in the United Kingdom. The Corporation does not, however, control nonradiating systems such as internal telephone equipment and data modems, unless the system is linked to the public network or uses lines or circuits leased from the Post Office. In these cases, Corporation approval is required. For information on published standards in the United Kingdom, see the "Additional Information" box at the end of this country survey. Britain participates in all ITU, CCITT, and CCIR conferences, and generally follows their standards.

Telephone and telegraph.—The United Kingdom's 19 million telephones (including 1,600 radiophones) represented a ratio of 31 instruments per 100 inhabitants in 1974. Businesses accounted for 44% of the telephones, and residential users 54%. The network comprised 6,553 exchanges, distributed among the following types:

Manual	0.7%
Strowger	85.8%
Crossbar	2.3%
Electronic	5.7%
Automanual	4.9%
Automatic trunk	0.6%

The Post Office has decided to adopt the TXE4 design for its next generation of exchanges rather than follow the worldwide trend toward computer-controlled crosspoint or crossbar switching.

Abbreviations

CCIR	**Consultative Committee on International Radio**
CCITT	**Consultative Committee on International Telephone and Telegraph**
EEC	**European Economic Community**
IFRB	**International Frequency Registration Board**
ITU	**International Telecommunications Union**

Table 1.—United Kingdom: Imports of communications equipment, 1972-75, projected 1980
(in millions of U.S. dollars)

BTN Classification [1]	1972	1973	1974	1975	1980
8513 Electrical line telephonic and telegraphic apparatus					
0458 Switchboards and exchanges	9.66	6.74	6.39	6.20	8
0593 Telephone instruments	2.32	2.98	3.26	1.40	4
0725 Morse transmitter/receiver/reperforators	7.34	4.34	6.33	4.10	7
0052 Line apparatus for long-distance communication (carrier, duplex and repeater) and speech input equipment	1.70	2.19	3.54	1.70	7
0807 Apparatus n.e.s.	4.60	6.92	21.74	15.00	45
0668 Parts (including apparatus for carrier-current systems)	13.06	28.58	—	—	—
0928 Parts: other than for carrier-current line systems	—	—	19.75	20.80	28
0337 Parts: carrier-current systems	—	—	8.39	3.40	8
0198 Apparatus for carrier-current systems, n.e.s.	—	—	4.02	.80	4
8515 Radio, TV, radar etc. transmitting, receiving, and combined transmission and receiver sets					
0037 Car radio receivers	9.54	19.38	—	—	—
0044 Other than car radio receivers	.65	3.45	—	—	—
8515 Radio Communications					
0998 Ground	3.39	5.53	—	—	—
0934 Transmitters—ground	—	—	.49	.30	1
4683 Receivers—ground	—	—	1.50	1.30	2
1986 Transmitter/receivers—ground	—	—	2.89	3.70	6
1121 Shipborne	1.94	2.86	—	—	—
1064 Transmitters—shipborne	—	—	.78	.30	1
4733 Receivers—shipborne	—	—	.81	1.10	3
2127 Transmitter/receivers—shipborne	—	—	2.91	1.90	33
0667 Transmitters designed or adapted for fitting to motor vehicles	—	—	.15	.10	1
1840 Transmitter/receivers designed or adapted for fitting to motor vehicles	—	—	2.93	2.50	2
5212 Transmitters, receivers, and transmitter/receivers designed or adapted for fitting to motor vehicles	—	—	.10	.20	1
1712 Transmitters, n.e.s.	—	—	.55	.60	1
8454 0397 Office machines, n.e.s.	8.25	8.76	10.97	11.16	15
9028 3498 Electrical measuring, checking, analysis or other controlling instruments and apparatus	56.47	70.27	74.42	86.05	128
8521 Microwave tubes					
0388 Magnetrons, excluding parts	.91	.72	.54	.35	—
0527 Klystrons, excluding parts	1.13	1.03	.91	.81	—
0580 Traveling	.53	1.03	NA	NA	NA
3142 Germanium transistors	3.17	3.33	3.49	3.72	5
Totals	124.66	168.11	176.86 [2]	167.49 [2]	310 [2]

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[1] Some BTN categories changed after 1973.

[2] Does not include 8521 0580.

Source: Import Trade Statistics, HM Customs and Excise; and Bureau of International Commerce, Office of International Marketing research study estimates.

More than 87% of calls within the United Kingdom, and nearly 68% of overseas calls, were direct-dialed in 1974, with a 99.6% completion rate. Almost 160,000 trunk speech channels (over 40 km radial length), not including radio terminal land lines or circuits carrying public telegraph systems, were available. The net worth of installed equipment for Post Office-operated telephone and allied services as of 1974 is shown below:

	Value Installed Equipment ($US millions)
Trunk and junction circuits (includes microwave, VHF and UHF links)	1,681.2
Local lines	1,483.2
Subscriber circuits	1,118.4
Exchange equipment	2,666.0
Telegraph equipment	137.9
Data transmission equipment	15.8

Table 2.—United Kingdom: Imports of telecommunications equipment by major supplier countries, 1974

(in thousands of U.S. dollars)

Electrical line telephonic and telegraphic apparatus	
Switchboards and exchanges	
United States	74
France	3,447
Sweden	2,235
Norway	260
Other	377
Total	6,393
Telephone instruments	
United States	1,881
Japan	260
Sweden	256
Germany	181
Other	678
Total	3,256
Morse transmitter/receiver/reperforators	
United States	2,305
Germany	1,984
Yugoslavia	1,409
France	219
Other	409
Total	6,326
Line apaparatus for long-distance communication (carrier, duplex and repeater) and speech input equipment	
United States	1,212
Belgium/Luxembourg	1,681
Sweden	153
Irish Republic	139
Other	359
Total	3,544
Apparatus n.e.s.	
United States	2,130
Sweden	12,430
Netherlands	2,037
Canada	1,305
Other	3,839
Total	21,741
Parts for other than carrier-current line systems	
United States	1,740
Irish Republic	4,884
Sweden	3,793
Belgium/Luxembourg	2,270
Other	7,064
Total	19,751
Parts for carrier-current systems	
United States	1,588
Germany	1,435
Belgium/Luxembourg	1,112
Irish Republic	953
Other	3,300
Total	8,388
Apparatus for carrier-current systems n.e.s.	
United States	2,033
Germany	781
France	647
Japan	123
Other	435
Total	4,019
Radio Communications	
Transmitters, ground	
United States	172
Germany	74
Switzerland	51
Denmark	39
Other	152
Total	488
Receivers, ground	
United States	553
Netherlands	314
Sweden	121
Switzerland	156
Other	358
Total	1,502
Transmitters/receivers, ground	
United States	930
Denmark	428
Japan	295
Germany	272
Other	968
Total	2,893
Transmitters, shipborne	
United States	151
Denmark	270
Sweden	139
Norway	107
Other	117
Total	784
Receivers, shipborne	
United States	374
Denmark	179
Sweden	165
Germany	37
Other	54
Total	809
Transmitter/receivers, shipborne	
United States	117
Denmark	2,041
Sweden	412
Norway	135
Other	201
Total	2,906
Transmitters designed or adapted for fitting to motor vehicles	
United States	9
Netherlands	91
Japan	16
Denmark	12
Other	18
Total	146

Table 2.—United Kingdom: Imports of telecommunications equipment by major supplier countries, 1974—Continued

(in thousands of U.S. dollars)

Transmitter/receivers, designed or adapted for fitting to motor vehicles	
United States	234
Denmark	1,551
Germany	960
Japan	72
Other	115
Total	2,932
Transmitters, receivers, and transmitter/receivers designed or adapted for fitting to motor vehicles	
United States	2
Netherlands	47
Australia	12
Denmark	12
Other	27
Total	100
Transmitters n.e.s.	
United States	37
Austria	174
Germany	158
Denmark	72
Other	112
Total	553
Office machines n.e.s.	
United States	4,400
Germany	2,309
Denmark	1,214
Switzerland	974
Other	2,075
Total	10,972
Electrical, measuring, checking, analysis, or other controlling instruments and apparatus	
United States	22,460
France	12,460
Germany	9,467
Netherlands	6,081
Other	23,951
Total	74,419
Microwave tubes	
Magnetrons, excluding parts	
United States	332
Japan	114
Netherlands	37
France	28
Other	24
Total	535
Klystrons, excluding parts	
United States	153
Switzerland	330
France	191
Japan	51
Other	182
Total	907
Traveling[1]	
United States	767
Netherlands	81
France	46
Sweden	44
Other	96
Total	1,034
Germanium transistors	
United States	407
Germany	1,388
Italy	577
Hong Kong	363
Other	753
Total	3,488
Total[2]	176,852
U.S. total[2]	43,294

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[1] 1973 data.

[2] Excludes traveling microwave tubes.

Source: Import Trade Statistics, HM Customs and Excise.

Miscellaneous	19.3
Plant for external services (includes one satellite Earth station)	225.6
Total installed plant	7,347.4

Microwave systems are used extensively for telephone and television transmission between major metropolitan centers; coaxial cables are utilized increasingly for wideband services. Britain has its single satellite ground station at Goonhilly Downs, with three operational systems and the appropriate backup equipment. Its capacity, equivalent to 1,300 telephone circuits, can be shared among video, voice, and data transmission.

The public telegraph and telex service employs multichannel voice-frequency systems, each system occupying one four-wire circuit in the telecommunications network. The Post Office competes in the open market for sales of private telegraph equipment, but monopolizes the supply of telex apparatus. The public telex service is a fully automatic teleprinter switching system; private teleprinter lines for continuous connections between two points can be rented from the Corporation. Telex has been replacing telegraph over the past few years, although overseas telegram traffic has remained essentially constant at around 20 million a year. Telex traffic within the United Kingdom grew from 32 million in 1970 to 48 million in 1974; in the same period, overseas telex connections rose from just under 10 million to almost 37 million.

Confravision, a Post Office service which allows simultaneous aural and visal communication between cities, uses custom-built studios linked to similar facilities in other cities by special coaxial cables and the microwave system. In 1975, limited experimental

Table 3.—United Kingdom: Total sales of communications equipment by domestic manufacturers (including exports), 1972-75, projected 1980

(in millions of U.S. dollars)

	1972	1973	1974	1975	1980
Public Telephone exchange equipment					
Electro-mechanical	355.0	462.5	440.0	265.1	373
Electric	35.0	53.1	62.5	48.5	160
Private telephone exchange equipment					
Electro-mechanical	63.0	65.4	95.3	88.4	116
PMBX	10.0	10.3	—	—	—
Switching and terminal equipment for telegraph, telex and data communications	110.0	30.6	34.2	34.2	42
Transmission equipment, including radio relay and microwave	130.0	136.1	118.4	104.7	128
Subscriber apparatus, including dials, transmitters and receivers	80.0	105.7	102.5	78.2	127
Parts for telecommunications equipment not listed under "Subscriber apparatus"	[1]	42.9	47.9	47.9	59
Other telecommunications equipment n.e.s.	[1]	32.7	31.9	26.7	30
CCTV equipment	—	17.0	18.8	18.9	22
Radio communications equipment					
Ground	n.a.	188.0	250.4	285.8	476
Shipborne	n.a.	32.2	33.8	30.8	36
Air and space	n.a.	19.2	31.1	32.6	49
Relay link apparatus	n.a.	4.5	[1]	[1]	[1]
Services	22.5	30.6	34.4	34.5	49
Total	805.5	1,230.8	1,301.2	1,096.3	1,667

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[1] Listed under "Switching and terminal equipment."

Source: Bureau of International Commerce, Office of International Marketing Research study; values based on official U.K. statistics and trade source estimates.

services existed between the United Kingdom and Malmo and Stockholm in Sweden, and the Hague and Amsterdam in the Netherlands.

The Post Office also provides tone signaling systems for transmitting industrial processes and other data, and recently introduced Postfax for document copying and transmission. The use of privately owned facsimile machines connected through the public telephone network is growing.

The Post Office competes in the open market for PBX equipment sales, but offers no models having more than 16 lines. The main suppliers—all private companies—have installed a total of some 5,000 exchanges. The vast proportion of these systems work on the Stronger principle; a gradual change to faster switching using reed electronic systems is expected. Existing PABXs are estimated at 3,700, of which 98% are electromechanical, either Strowger or crossbar. The most sophisticated PABX equipment offered by the Post Office is designed to accommodate up to 20 exchange lines and 100 extensions.

Data communications.—Data transmission has assumed ever-greater importance as electronic information processing has burgeoned. The number of computer systems installed in the United Kingdom rose from 7,800 in 1974 tod 9,300 in 1975, and is expected to increase 10% annually through 1980. Data communication is provided by the Post Office's "Datel system," which offers speeds from 50 bps to 2,400 bps plus a wideband circuit with 40.8K, 48K and 50K bps. Transmission costs are reduced by using Dataplex when appropriate. Dataplex System 1 employs frequency division multiplexing at speeds up to 110 bps with a choice of 6- or 12-channel marking. Dataplex System 2 uses time division multiplexing and can handle certain data up to 1,200 bps. The maximum number of divided circuits depends on the modem employed, which can be 2,400 bps or 4,800 bps. The Datel system is modular in concept and can be continually modified to match the user's changing requirements.

The Post Office's responsibility for data communications equipment is generally limited to the provision of interfacing modems. The Corporation must approve but does not supply terminal or other data transmission equipment as such.

Nonbroadcast radio.—The Post Office introduced public mobile radio service to London in 1963 using the 150 kHz frequency band, and had 2,000 subscribers by 1975. The number of private mobile systems licenses rose from 9,972 in July 1974 to 10,313 in July 1975. A breakdown by type of installation in 1975 was as follows:

Road vehicles	139,676
Ship stations	3,023
Hand portables	33,147
Transportables	942
Total mobile stations	176,788
Base stations	13,229

In 1975, police, fire, ambulance, local engineering and public health departments, and the national bus company held licenses for 795 systems, including 837 base stations and 19,258 mobile installations. About one-half were police networks which at times included vehicle location and status indicator and a few voice-bandwidth facsimile systems. Other major users are the public utilities, taxis, the Automobile Association, the Royal Automobile Club, the transportation sector, and some larger industrial concerns.

Important consumers of hand portable and transportable stations are: Dock and Harbor Authorities, particularly for mobile crane operations; civil engineering contractors, for major construction projects; and land surveyors. In a few very remote areas, group medical practices have been granted mobile system licenses.

Radio paging systems fall under the Post Office's control and are being developed as an extension of the public telephone system .An experimental system was set up for a maximum of 2,000 subscribers in the South Yorkshire and London areas. Private users are not normally permitted to operate radio paging services that radiate beyond the enclosed premises. Induction-loop techniques are fairly extensively employed in hospitals, public administration buildings, and some private industrial offices and works, but most of these are selective alerting devices only. The use of paging systems is growing rapidly, with sales expected to rise from $6 million in 1975 to $13 million annually by 1980.

All nonbroadcast radio systems must be licensed by the Post Office. To be approved, the system must be essential to the proper conduct of the licensees' affairs and must provide a communications capability not available through any Post Office service. Post Office specifications completely define the technical parameters of equipment and the performance of the system. (ITU Radio Regulations and IFRB procedures are generally observed.)

Radiophone equipment must be leased from the Post Office, but apparatus for private mobile radio service can be purchased anywhere provided type-approval specifications are met. Mandatory standards dictate very up-to-date equipment except in some sparsely populated remote areas where older equipment is allowed. There is now some bias in favor of UHF (450 MHz) systems rather than VHF frequencies, but no new frequency allocations are expected before 1981. Equipment for private paging systems must be leased from the Post Office or meet type-approval requirements.

Closed circuit television.—CCTV usage has increased rapidly in recent years, for purposes of surveillance, teaching, public display and process and traffic monitoring. Significant users include large retail stores, police, dock authorities, local administrators (for traffic surveillance), transport system terminals and educational institutions (where VTRs are used extensively), and research. Standards and techniques are based on television broadcast standards in Great Britain (625 lines interlaced, 50 frames per second), although resolution up to 1,000 lines are used.

The installation of cable and closed circuit television is under the jurisdiction of the Post Office. However, procurement is competitive in the private sector. The Post Office is procuring broadband cable and head-end transmission equipment, and may take an interest in the more complex terminal display systems as interrogation and interactive systems become available. The major market for the latter is thought to be in the educational and advertising fields.

Major Purchasers

Post Office Corporation.—Despite the country's recent economic difficulties, the Post Office budgeted $247 million for telephone exchange equipment in 1976 and another $281 million in 1977. The Corporation's major focus is on increasing the number of household subscribers from 50% to 80% or more by the early 1980s. Additions to the choice of handsets are being made and the range of ancillary facilities is being extended, including such items as tape-call makers, repertory dialing systems and dynamic answering and call-recording units. The Post Office does not supply answering and recording machines at present but expects to do so in the near future.

Discussions are continuing between the Post Office and the telecommunications industry regarding installation of a fully electronic exchange "System X." Although cut-backs in funds are expected to delay the project, it is certain to eventually become a reality. A second ground station to handle the bulk of Indian Ocean satellite traffic is scheduled for construction at Herefordshire in the near future.

The Post Office policy regarding telex development aims not toward higher transmission speeds, but increasing the range of telex terminal equipment available to users and automating their facilities. Stored program control could be available in the telex network by the 1980s. However, the Post Office does not plan to compete in the market for private telegraph systems.

The experimental radio paging system in the Thames Valley is to be extended and another, much larger system (20,000 subscriber initial capacity) is slated for London. There appears to be a clear demand for a national paging system and if this is provided, it will be under the aegis of the Post Office. Licenses to private operators will continue to be granted, but limited to specific geographic areas with no interlinking between systems.

Retail.—The retail trades comprised 573,000 establishments employing 2.6 million people with total sales of $40.6 billion in 1971. Over 90 of these companies employed over 500, including 26 with over 1,000. The replanning of town centers has led to a reduction in the number of small shops and an increase in the number of supermarkets and large chain stores, increasing the market for CCTV surveillance equipment. Companies are also enlarging the number of outlets in their chains, thereby multiplying the demand for data transmission equipment.

Banking and finance.—London is the center of the banking and financial network of Great Britain, and one of the world's major financial centers. As of June 1975, the United Kingdom had 400 banks (including foreign-owned) with combined assets of over $320 billion. In addition, the nation had 447 savings and loan institutions (called "building societies") with $47 billion in assets, 785 insurance companies ($56.6 billion), about 300 investment trust companies ($4.6 billion), and 320 unit trust companies ($14 billion). The sector employed 266,000 people in insurance, 288,000 in banking, and 113,000 in other financial establishments.

The banking sector is an extensive user of telecommunications equipment, and most of the large national banks, including Barclays, Midland, and National Westminster, are installing large PABXs capable of handling up to 4,500 lines each. Widespread use is made of data transmission equipment such as concentrators, message switchers, teleprinter, and facsimile machines; the latter are supplied mainly by Plessey, built from an American design. Mobile radios and CCTV are commonly employed for security purposes.

Education.—One-fifth of the British population is in full-time attendance at some type of educational establishment. Some 1 million of the 11 million students attend institutions of higher education. England and Wales combined have about 630 major facilities for further education including polytechnics, technical colleges, and specialist colleges for particular trades and professions. In addition, 44 universities and 5 other institutions provide courses at a university level.

Lecturing via CCTV is spreading rapidly, especially among higher education facilities and larger school districts. For instance, the Inner London Education Authority's system links about 1,400 establishments and, with the associated high frequency transmission requirements, provides a telecommunications market of considerable size under unified purchasing control. Some 32,000 schools utilize radio educational broadcasting and 27,000 schools benefit from televised materials. There are 1,700 school language laboratories, and tape recorders are used in many audiovisual teaching methods. Sales of data transmission equipment is also growing; as the large-scale use of computer time-sharing brings data processing terminal to more small-scale users. Research facilities provide a small market for replacement purchasing and the latest "state-of-the-art" equipment.

Hospitals.—The National Health Service covers essentially the entire British population; it is administered by 14 regional health authorities who regulate the design and construction of new buildings and works. Most of the 2,724 hospitals in Great Britain (including Scotland and Northern Ireland) in 1973 had less than 250 beds, although 276 had more than 500. Hospital employees included 31,000 medical staffs, 358,000 nurses, 21,000 midwives, and 47,000 professional/technical staff.

Hospitals are augmenting their services with a wide variety of telecommunications systems. The demand for long-range paging systems is sure to climb in the future, and patient monitoring and service via telephone and paging systems will probably expand. For these purposes, systems which can be integrated into existing buildings will be necessary.

All hospital services are becoming increasingly centralized. Organs available for transplant are re-

Additional Information

This Survey is one of a series based on market research reports prepared overseas for the Office of International Marketing. Other detailed marketing information on United Kingdom is available on a continuing basis from:

Country Marketing Manager—United Kingdom
Office of International Marketing
BIC/DIBA
U.S. Department of Commerce
Washington, D.C. 20230

A copy of the original research which this Country Market Survey summarizes is available at a cost of $10 from:

National Technical Information Service
U.S. Department of Commerce
Springfield, Virginia 22161
Sales desk telephone: (301) 557-4650

The report covers: (1) a detailed description of the national telecommunications network, (2) discussion of the market with special sections on products of particular interest to U.S. manufacturers, (3) descriptions of all major end-user sectors, (4) competitive situation, including U.S., third-country and domestic suppliers, (5) tariff rates, and (6) lists of potential purchasers, trade associations and publications. Please request: "The Market for Communication Equipment and Systems: United Kingdom," DIB 76-05,507, September 1975.

Information on the availability of published standards in the United Kingdom may be obtained from the National Technical Information Service, Technical Help to Exporters, Springfield, Virginia 22161.

corded in one location with the information retrievable on demand. Telex facilities are being used for an increasing number of applications, including record-keeping functions. Widespread acceptance of computer diagnosis by the medical profession will bring increased sales of data link equipment for connection to central computers. Computers are gaining in importance in a variety of patient-care and hospital administrative purposes. CCTV use is expanding, particularly in the teaching hospitals.

U.S. Government Services for American Exporters

MARKETING ASSISTANCE AND INFORMATION SERVICES

U.S. Trade Promotion Facilities Abroad

U.S. Trade promotion facilities abroad provide U.S. manufacturers with an opportunity for testing and selling their products in key foreign markets. These facilities are a home away from home for the U.S. business representative where he can also exhibit his products and receive business counseling and assistance.

Listed below are the 16 U.S. trade promotion facilities located in major cities in Europe, Asia, Australia and Latin America.

AUSTRALIA—U.S. Trade Center
37 Pitt Street
Sydney NSW 2000

AUSTRIA—U.S. East-West Trade Development Office
Prinz Eugen Strasse 8-10
A-1040
Vienna

BRAZIL—U.S. Trade Center
Avenida Paulista 2439
Edificio Eloy Chavez
01311 Sao Paulo

FRANCE—U.S. Trade Center
123 Avenue Charles de Gaulle
92200 Neuilly
Paris

GERMANY—U.S. International Marketing Center
1-9 Bahnhofstrasse
D-5000 Cologne 1

IRAN—U.S. Trade Center
61 Queen Elizabeth II Boulevard
P.O. Box 50
Tehran

ITALY—U.S. Trade Center
Via Gattamelata 5
20149 Milan

JAPAN—U.S. Trade Center
Tameike Tokyo Building
1-14 Akassaka. 1-Chome
Minato-Ku
Tokyo 107
American Merchandise Display Center
Sankei Kaikan Building
27, Umeda-Cho, Kita-Ku
Osaka

KOREA—U.S. Trade Center
American Embassy
82 Sejon-Ro
Seoul

MEXICO—U.S. Trade Center
Apartado Postal
M-2805
Mexico City 1, D.F.

POLAND—U.S. Trade Development Center
Ulica Wiejska 20
Warsaw

SINGAPORE—U.S. Trade Center
268 Orchard Road
Yen San Building
Singapore 9

SWEDEN—U.S. Trade Center
Vasagatan 11
Stockholm

TAIWAN—U.S. Trade Center
Taiwan Glass Co. Bldg.
261 Nanking East Road
Taipei

UNITED KINGDOM—U.S. Trade Center
4/5 Langham Place
London W1

U.S.S.R.—U.S. Commercial Office in Moscow
c/o American Embassy
Department of State
Washington, D.C. 20520

Information on exhibitions at trade promotion facilities abroad may be obtained from Country Marketing Managers or Commerce district offices.

Country Consultants

Country Marketing Managers (CMMs) provide U.S. firms with marketing information by specific country, counseling on the preparation of effective marketing plans, aids in selecting best opportunity markets and assistance in participating in Commerce trade promotion activities. The CMM also can assist in obtaining other foreign business information available within the U.S. Government.

In addition, the CMM's receive an enormous quantity of information, both published and unpublished, on their countries. This data comes from private and public sources, American and foreign. It includes periodic reports received from the commercial sections of U.S. Embassies on selected industries or product categories, "best prospects" for sales in the coming year, and new developments and opportunities of special interest to the U.S. business community.

The Country Marketing Manager provides guidance and direction in commercial activities to the U.S. Foreign Service—Department of State, Trade Center Staffs, Commercial Fairs staffs, and other trade promotion personnel. This includes the planning and implementation of trade promotional activities listed earlier ("Global Marketing Program") within the respective country or countries. The CMM is the focal point in Commerce for the development and implementation of the annual Country Commercial Program, jointly prepared by Commerce and the Foreign Service. This operational planning document establishes objectives and priorities for U.S. Government trade promotion and support of U.S. business by country, and the actions to be undertaken to achieve them.

For further information and assistance on marketing abroad, please call or write the appropriate manager (see last page for list).

International Marketing Publications

The Bureau of International Commerce makes available to U.S. business a series of publications focusing on foreign market opportunities for U.S. suppliers. The series is made available by the Bureau's Office of International Marketing in cooperation with the U.S. Foreign Service-Department of State. Most reports are based on research conducted by overseas contractors under U.S. Foreign Service supervision or by economic and commercial officers of the Foreign Service or Department of Commerce.

Some of the data in this series is reproduced in its original unevaluated form and the distribution of this document does not necessarily imply the concurrence of the Department of Commerce in the opinions or conclusions contained therein.

As part of its marketing information program, OIM makes available to the U.S. business community, on a continuing basis, eight types of publications and reports.

1. *Global Market Surveys:* In-depth reports covering 20–30 of the best foreign markets for a single U.S. industry or a group of related industries.
2. *Country Market Sectoral Surveys:* In-depth reports covering the most promising U.S. export opportunities in a single foreign country. About 15 leading industrial sectors are usually included.
3. *Producer Goods Research:* In-depth reports covering the best foreign sales opportunities for a single U.S. producer goods industry, or group of industries.
4. *Consumer Goods Research:* In-depth reports covering the best foreign sales opportunities for a single U.S. consumer goods industry, or group of industries.
5. *Overseas Business Reports:* Reports that include current and detailed marketing information on all of our leading trading partners. Most are revised annually.
6. *Foreign Economic Trend Reports:* Annual or semiannual reports prepared by the U.S. Foreign Service that cover, individually, almost every country in the world.
7. *International Marketing Events:* Brief market summaries in support of trade promotion events organized by the Office of International Marketing. Also, detailed calendars of upcoming events.

To supplement and up-date the marketing information available in this series, and for specific ordering information, we suggest that you telephone the nearest Department of Commerce District Office or the Country Marketing Manager responsible for the area or areas in which you are interested. A directory of these key people and offices is printed on the last page.

Export Information Services

The export information services described below can be obtained by contacting the U.S. Department of Commerce, Office of Export Development, Export Information Division, Room 1033, Washington, D.C. 20230, or the nearest of the Department's 43 district offices (listed on inside back cover).

Trade Lists

Names and addresses of foreign distributors, agents, purchasers, and other firms are made available to U.S. firms through a series of trade lists. *Business Firms Trade Lists* cover all commercial establishments in smaller developing countries. *State Trading Organizations Trade Lists* name and describe government-controlled foreign trade organizations in nonmarket economy countries.

World Traders Data Reports

World Traders Data Reports (WTDR's) provide descriptive background information on specific foreign firms. Prepared by the U.S. Foreign Service, the WTDR's include such information as year of establishment, method of operation, lines handled, size of sales territory, name of chief executive, general reputation in trade and financial circles, names and addresses of credit sources, names of the firm's connections, and other commercial information. The complete name, street and city address of the foreign firm must be given when requesting this service. Nominal fee.

Agent/Distributor Service

The Commerce Department's Agent/Distributor Service helps U.S. firms find agents or distributors for their products in almost every country of the world. U.S. Foreign Service Officers overseas will identify up to three foreign firms that express interest in a specific U.S. proposal. The charge for this service is $25. Application forms (DIB-424P) may be obtained from any Commerce Department District Office.

Export Mailing List Service

The Export Mailing List Service (EMLS) provides lists of foreign firms considered prospective customers for U.S. firms. Firms are drawn from the automated Foreign Traders Index. Their names and addresses are available on gummed mailing labels or in standard printout form. Printouts also include: Name and title of an officer, type of organization, year of establishment, relative size, number of employees and sales-persons, and product and/or service codes (Standard Industrial Classification numbers).

The cost of a list comprises a $10 set-up charge and an additional 6¢ per name listed. Delivery can be made in about 15 days.

Foreign Traders Index (FTI) Data Tape Service

This service is offered as a convenience to firms that have a continuing need for a broad range of foreign commercial data, such as export management firms selling a wide range of products. This service provides, in magnetic tape form, information on all firms in one or more countries covered in the Foreign Traders Index. Users may thus retrieve various segments of FTI data by running tapes through their own computer facilities. There is a flat fee for this service on a per-country basis for up to 15 countries. A single, fixed charge is made for a package of 15 or more countries or for the entire file.

Overseas Business Opportunities

The overseas business opportunities services described below can be obtained by contacting the U.S. Department of Commerce, Office of Export Development, Overseas Business Opportunities Division, Room 2323, Washington, D.C. or the nearest of the Department's 43 district offices.

Trade Opportunities Program

The Trade Opportunities Program (TOP) receives up-to-date trade leads from U.S. Foreign Service posts around the world and disseminates them to U.S. suppliers. Trade opportunities are based on inquiries by overseas companies that wish to purchase American products or services, or who are interested in representing U.S. firms. Trade opportunities may come from private commercial organizations, from foreign governments, or even from multinational organizations such as NATO or the UN.

To register for TOP, U.S. firms are requested to specify their product and country interests and the types of commercial information desired—direct sales, representation, and/or foreign government tenders. As leads are developed by the Foreign Service, they are cabled to Washington, where they are matched by computer against the criteria established by U.S. companies. These leads are then mailed to appropriate U.S. firms within a week of their origination overseas. Trade leads are charged against prepaid subscriptions.

Overseas Product Sales Group

The Overseas Product Sales Group (OPS) provides personalized assistance to TOP subscribers, or to firms identified as having high export capability, in bidding against foreign competitors for specific export sales opportunities with a value of $1 million or more. The OPS specialists collect, inventory and disseminate early information on export sales opportunities from TOP and a variety of other sources.

Foreign Investment Services Staff

The Foreign Investment Services Staff (FISS) is the focal point for American and foreign business inquiries relating to U.S. investment and licensing abroad. American businessmen are assisted in locating potential overseas licensees and partners, are provided with investment data on specific regions and countries, and then guided toward sources of capital for these proposed projects. Foreign investment and licensing proposals for which U.S. participation and technology is sought are published regularly in *Commerce America* and are brought to the direct attention of American firms where appropriate. In carrying out its broad range of activities, FISS works closely with other U.S. Government assistance sources, multinational agencies and private regional investment organizations.

Office of Export Administration

Information on U.S. export control regulations may be obtained from the U.S. Department of Commerce, Bureau of East-West Trade, Office of Export Administration, Washington, D.C. 20230. Telephone: (202) 377-4811.

FINANCING EXPORT SALES

The Export Import Bank of the United States (Eximbank) is an independent agency of the United States created by Act of Congress to facilitate and help finance U.S. exports. It does this through loans to overseas buyers of U.S. equipment and services where the repayment term customary in international commerce exceeds 5 years, and through insurance and guarantees of loans extended by U.S. commercial banks and exporters to finance reports on short and medium term (up to 5 years). Other programs include loans to overseas banks which arrange financing of their customers' import requirements. All disbursements are made against evidence of shipment from the United States.

Equipment and services loans are those extended to non-U.S. buyers of U.S. goods. In a typical instance, a foreign firm seeking to establish a new manufacturing line will obtain financing from Eximbank for a portion of the cost of the U.S. equipment to be purchased. This portion is generally about 40% of the contract price. There is a minimum cash payment of 15% required, and the balance of the financing is obtained from other lenders, occasionally with Eximbank's comprehensive guaranty of repayment. Often Eximbank will require a guarantor on its loan. In authorizing these loans, Eximbank will fix a rate of interest to be paid throughout the life of the loan, the specific rate depending upon the maturity schedule—the longer the repayment term, the higher the interest rate. Current interest rates are in the range of from 8 to 9% per annum. The rate increases one-eighth of 1% for each additional year of maturity after 5 years from authorization. In addition to the interest rate, Eximbank charges a commitment fee on the undisbursed balance, currently one-half of 1% per annum.

When borrowers are unable to arrange for the balance of the necessary financing on their own strength, Eximbank may issue its repayment guaranty to a U.S. financial institution. The fee charged for this guaranty, as with interest rates on Eximbank loans, is in a range, reflecting both term and Eximbank's assessment of risk. The range currently in use is from one-half of 1% up to 1.5% per annum on outstanding balances. There is also a commitment fee for financial guaranties, currently one-eighth of 1% per annum on undisbursed balances.

The Cooperative Financing Facility is a program through which Eximbank extends loans to cooperating banks abroad, covering one-half of the financed portion (after the minimum 15% cash payment), for U.S. purchases with the participant providing the remaining financing. This program enables buyers abroad to deal with their own banks, where they are familiar with local laws, language and customs. Eximbank, on its part, lends to the participating bank and is relieved of the credit risk of the individual buyer. This program is intended for smaller transactions where the maturity of the loan is 5 years or less.

As with most other export credit agencies in industrialized countries, Eximbank operates a supplier credit program. In addition to that of the Foreign Credit Insurance Association discussed above, Eximbank is prepared to extend to participating U.S. banks its comprehensive guaranty of repayment (against specified risks) for non-recourse export financing extended to their U.S. customers.

Businessmen and bankers—both U.S. and overseas—are invited to make use of Eximbank's counselling services, which include information on money markets in the United States, credit information on overseas buyers, and details on each of the programs discussed here.

For further information communicate with Eximbank, 811 Vermont Avenue, N.W., Washington, D.C. 20571—Telex 89-461.

EXPORT CREDIT INSURANCE

The Foreign Credit Insurance Association (FCIA) is an association of 53 stock and mutual insurance companies in partnership with the Export-Import Bank of the United States. It offers a comprehensive selection of credit insurance policies which protect policy holders against loss from failure to receive payment from foreign buyers.

The benefits of this coverage may be summed up as follows:

- It protects the exporter against the failure of the buyer to pay his dollar obligation for commercial or political reasons.
- It enables the exporter to offer foreign buyers competitive terms of payment.
- It supports the exporter's prudent pentration of higher risk foreign markets.
- It gives the exporter greater financial liquidity and flexibility in administering his foreign receivables portfolio.

Who May Be Insured

Virtually any corporation, partnership or individual doing business in the United States is eligible for FCIA coverage. An exporter may apply for a policy for himself or may become insured under the blanket policy of a bank or other financial institution which holds an FCIA policy.

Eligible Products

Foreign sales of all types of industrial, agricultural, and commercial products produced in the United States and of services rendered by U.S.-based personnel are eligible for FCIA insurance.

What Losses Are Covered

Comprehensive FCIA policies protect insureds against nonpayment of receivables due to unforeseeable commercial and political occurrences. Commercial risks which are covered include insolvency of the buyer or protracted defaults which may well arise from economic deterioration in the buyer's market area, shifts in demands, unanticipated competition, tariffs, or technological changes. Also covered are defaults due to such buyer problems as increasing expenses, the loss of key personnel, and natural disasters.

Political risks coverage applies to defaults due to governmental action and to political disturbances such as war, revolution, and insurrection. Such events may result in confiscation of the buyer's assets, detention or diversion of shipments, or cancellation of necessary licenses by the United States or by the buyer's country. Also covered is the inability or refusal of the foreign central bank involved to convert the buyer's currency to dollars. Political coverage alone is available for exporters who desire to assume their own commercial risks.

The Policies

The policies offered by FCIA are many and varied. They can be tailored to suit the needs of the individual exporters, service groups, and financial institutions. Aside from a small applicant fee, all premiums are paid only for goods actually shipped.

The Master Policy combines a deductible provision, discretionary credit authority, and once-a-year reporting to provide qualified exporters with lower premiums, independent credit decisions, faster services to overseas buyers, and less paperwork. It is a blanket policy which requires the exporter to insure all or a reasonable spread of his exportation.

The Short-Term Policy is a blanket policy which covers sales on terms of up to 180 days. It provides coverage of 90% for commercial losses and 95% for political losses. A moderate discretionary credit limit is included for each buyer.

The Medium-Term Policy provides 90% coverage (political and commercial) for capital and quasi-capital goods sold on terms of 181 days to 5 years. The policy is written on a case-by-case basis so an exporter need not insure all his medium-term transactions as he would under a blanket policy.

The Combination Policy provides short- and medium-term insurance to protect U.S. exporters in transactions with overseas dealers and distributors. It includes flexible coverage for short-term sales and for both inventory and receivable financing.

The Comprehensive Services Policy insures the receivables generated by the performance of services for foreign customers by U.S.-based personnel, or by U.S. personnel temporarily assigned overseas. Industries benefiting from this coverage include management consultants, engineering and related construction consulting services, and transportation companies.

Special Coverage Endorsements are available in addition to the above policies. These include endorsements to cover specified preshipment risks and consignment selling.

An Aid to Financing

FCIA does not finance export sales. However, the exporter who insures his accounts receivable against commercial and political risks is usually able to obtain financing from commercial banks and other lending institutions at lower rates and on more liberal terms than would otherwise be possible.

Prequalification of Buyers

FCIA's rapidly expanding prequalifying (P.Q.) program is now providing credit information on overseas buyers through its computerized data system. All the exporter needs to do is telephone the nearest FCIA office to determine whether a particular buyer is prequalified for the amount of his purchase.

Information About FCIA

More information about FCIA's services, and applications for policies, may be obtained through insurance agents or brokers or through FCIA's network of full-service regional offices. General questions and specific inquiries may be directed toward the FCIA Ombudsman in the New York office. Call (213) 432-6216 for a direct connection.

FCIA Offices

One World Trade Center—9th Floor
New York, New York 10048
Phone: (212) 432-6200

1250 South OmniInternational
Atlanta, Georgia 30303

Suite 1552
10 South Riverside Plaza
Chicago, Illinois 60606

Suite 1300
55 Public Square
Cleveland, Ohio 44113

Suite 1790
611 West Sixth Street
Los Angeles, California 90017

Suite 1110—First Federal Bldg.
700 North Water Street
Milwaukee, Wisconsin 53202

C&I Building—Suite 1408
1006 Main Street
Houston, Texas 77002

Suite 205
1 Embarcadero Center
San Francisco, California 94111

Woodward Building, Suite 420
15th & H Streets, N.W.
Washington, D.C. 20005

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Commerce District Offices

Albuquerque, 87101, (505) 766-2386.
Anchorage, 99501, (907) 265-5307.
Atlanta, 30309, (404) 881-7000.
Baltimore, 21202, (301) 962-3560.
Birmingham, Ala., 35205, (205) 254-1331.
Boston, 02116, (617) 223-2312.
Buffalo, N.Y., 14202, (716) 842-3208.
Charleston, W.Va., 25301, (304) 343-6181, Ext. 375.
Cheyenne, 82001, (301) 778-2220, Ext. 2151.
Chicago, 60603, (312) 353-4450.
Cincinnati, 45202, (513) 684-2944.
Cleveland, 44114, (216) 522-4750.
Columbia, S.C., 29204, (803) 765-5345.
Dallas, 75202, (214) 749-1515.
Denver, 80202, (303) 837-3246.
Des Moines, 50309, (515) 284-4222.
Detroit, 48226, (313) 226-3650.
Greensboro, N.C., 37402, (919) 378-5345.
Hartford, 06103, (203) 244-3530.
Honolulu, 96813, (808) 546-8694.
Houston, 77002, (713) 226-4231.
Indianapolis, 46204, (317) 269-6214.
Los Angeles, 90024, (213) 824-7591.
Memphis, 38103, (901) 521-3213.
Miami, 33130, (305) 350-5267.
Milwaukee, 53202, (414) 224-3473.
Minneapolis, 55401, (612) 725-2133.
New Orleans, 70130, (504) 589-6546.
New York, 10007, (212) 264-0634.
Newark, N.J., 07102, (201) 645-6214.
Omaha, 68102, (402) 221-3665.
Philadelphia, 19106, (215) 597-2850.
Phoenix, 85004, (602) 261-3285.
Pittsburgh, 15222, (412) 644-2850.
Portland, Ore., 97205, (503) 221-3001
Reno, 89502, (702) 784-5203.
Richmond, Va., 23240, (804) 782-2246.
St. Louis, 63105, (314) 425-3302.
Salt Lake City, 84138, (801) 524-5116.
San Francisco, 94102, (415) 556-5860.
San Juan, P.R., 00902, (809) 753-4343, Ext. 4555.
Savannah, 31402, (912) 232-4321, Ext. 204.
Seattle, 98109, (206) 442-5615.

Country Marketing Managers

Commercial and economic information on most trading partners of the United States is available from the U.S. Department of Commerce.

A Country Marketing Manager is responsible for a country or group of countries as listed below. Assistance or information about marketing in these countries may be obtained by dialing these key people directly: 202-377 plus the given extension.

Bureau of International Commerce

Area	**Extension**
Africa	
Algeria, Libya, Morocco, Tunisia	5767
Remainder of Africa (except Egypt)	3865
Europe	
France and Benelux Countries	4504
Germany and Austria	5228
Italy, Greece and Turkey	3944
Nordic countries	3848
Spain, Portugal, Switzerland and Yugoslavia	2795
United Kingdom and Canada	4421
Far East	
Australia and New Zealand	3646
East Asia and Pacific	5401
Japan	2425
Southeast Asia	2522
Latin America	
Brazil, Argentina, Paraguay and Uruguay	5427
Mexico, Central America, and Panama	2314
Remainder of South America and Caribbean countries	2995
Near East	
Bahrain, Iraq, Jordan, Kuwait, Lebanon, Oman, Peoples Democratic Republic of Yemen, Qatar, Saudi Arabia, Syria, United Arab Emirates, Yemen Arab Republic	5767
Iran, Israel, Egypt	3752

Bureau of East-West Trade

Eastern Europe	2645
USSR	4655
Peoples Republic of China	3583

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